



DESIGNING A SCHOOL GARDEN

Sandy McGroarty, An Taisce Green-Schools

Designing the Garden

- Why do you want a garden?
- Ornamental
- Edible
- Forest Garden
- Outdoor Classroom
- Biodiversity
- Maintenance over the Summer
- Water conservation

Some Ideas

- ❑ Forest garden (Permaculture design)
- ❑ Biodiversity Garden
- ❑ Organic gardening
- ❑ Outdoor Classroom
- ❑ Using re-cycled materials
- ❑ Rainwater Harvesting

Forest Gardens

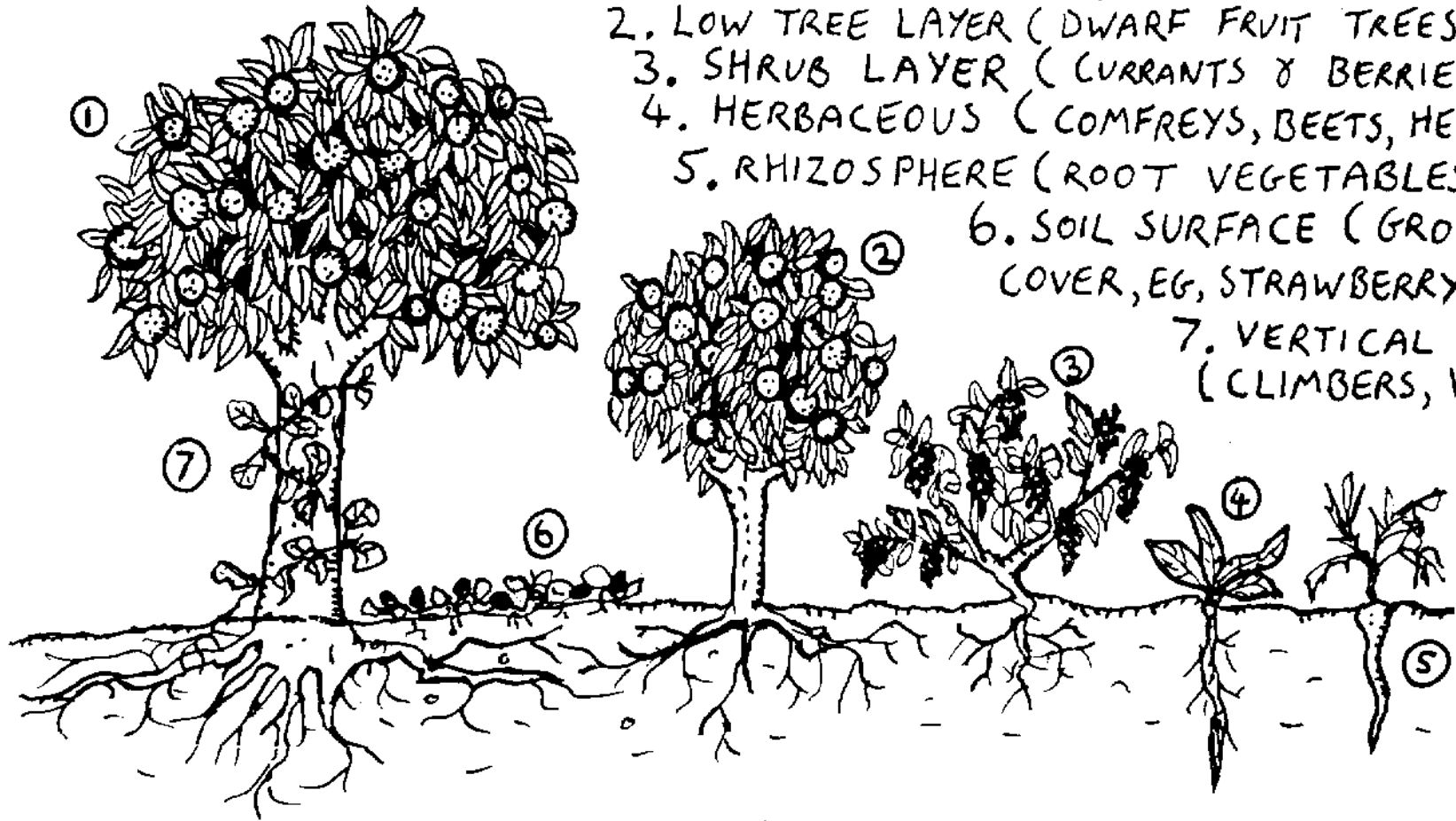
- The ZEN of all gardens
- Collection of trees, shrubs and plants that grow together to share resources, shelter and shade each other, fertilise each other and be friends
- No-dig system
- Weed control: ground cover plants + mulches
- Pest find it difficult to find the plants (ie not monocultures)
- Careful planning, observation and hard work at the beginning

Edible Forest Gardens

- A forest garden is based on perennial plants
- School year doesn't fit into annual vegetable crops as they are closed for the growing + harvesting season
- Low-maintenance with little attention in Summer
- Food during school months
- Excellent habitat for wildlife
- Beautiful space
- Learning opportunities



1. CANOPY (LARGE FRUIT & NUT TREES)
2. LOW TREE LAYER (DWARF FRUIT TREES)
3. SHRUB LAYER (CURRANTS & BERRIES)
4. HERBACEOUS (COMFREYS, BEETS, HERBS)
5. RHIZOSPHERE (ROOT VEGETABLES)
6. SOIL SURFACE (GROUND COVER, EG, STRAWBERRY, ETC)
7. VERTICAL LAYER (CLIMBERS, VINES)



THE FOREST GARDEN: A SEVEN LEVEL BENEFICIAL GUILD

Choosing + Growing your Plant Stock

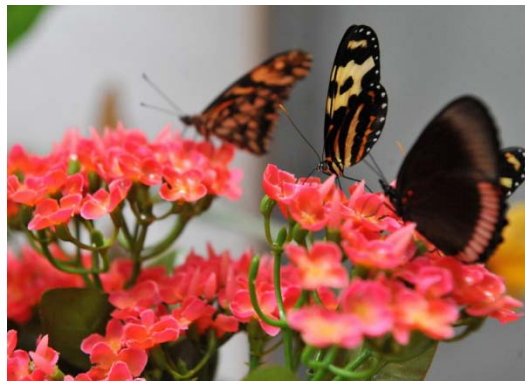
Plant	Wildlife Value	Other Uses	Annual or Perennial	Forest Layer
Comfrey	Nectar for insects- especially bumble bees	Add to compost heap or use as mulch*. Make a plant feed - especially good for fruiting plants	Perennial	Herbaceous
Elder	Nectar from flowers for insects. Berries for birds and insects	Insect repellent - from leaves Fruit - Litmus test Planted near compost heap it helps the process	Perennial	Canopy
Calendula/Marigold	Nectar for insects	Insect deterrent in garden. Weather forecaster - flowers close before rain	Annual, will self-seed	Herbaceous
Soapwort	Food plant for some butterfly and moth caterpillars	You can make a mild soap from the whole plant	Perennial	Herbaceous
Bluebell	Nectar for bees and other insects	You can make a glue from the bulbs	Perennial	Root layer

* Mulch is anything a gardener uses to cover the ground around the plants. Mulch keeps in moisture, stop weeds from coming up and some even fertilise the soil. An easy mulch for a school is wet cardboard or layers of wet newspaper topped with grass clippings, straw, seaweed or bark mulch.

Name	Perennial/Annual	Sow seeds indoors	Plant out	Harvest	Care
Autumn Fruiting raspberries	Perennial		Buy canes and plant in January	September/October	Cut canes back after fruiting in November
Brussels sprouts	Annual	Early March	Early-Mid May	October to January	Water well and mulch after planting out
Purple sprouting broccoli	Annual	Early March	Early-Mid May	Following February/March	Water well and mulch after planting out
Lettuce	Annual	From March onwards	When plants have 5 leaves	May/June	Slug control-beer traps or other organic methods
Pumpkins	Annual	April	Late May	September/October	Water well and mulch after planting out
Early peas	Annual	Early March	April	June	Keep watered. Support with canes or twigs
Broad beans	Annual	Sow directly into ground in February		May/June	
Fruit trees	Perennial	Plant young trees in the winter months		August-October depending on variety	Mulch well when planting. Mulch again once a year in Spring. Prune once a year in Winter

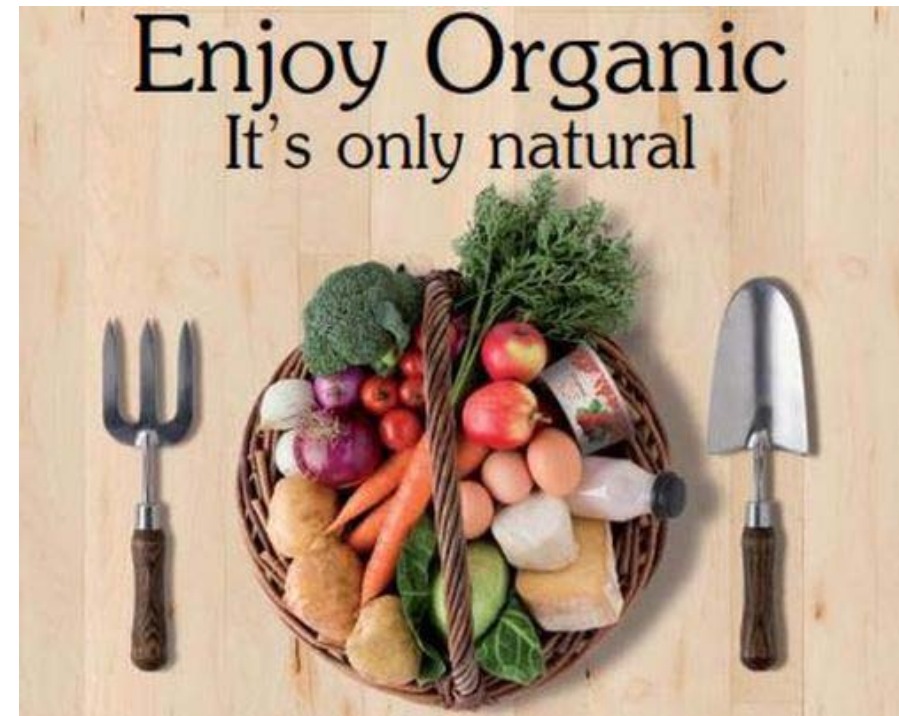
Biodiversity Garden

- Attract wildlife: Butterflies, Bees, Birds, Insects, Bats
- Plant native species- attract native species !
- Plants with early, mid and late season flowers
- Wildflowers, Lawn flowers, trees, shrubs
- Fruits, dead materials
- Hedgerows, Wildlife corridors
- Bird/bat boxes, bug hotels
- Biodiversity Trail









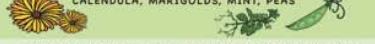


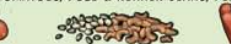

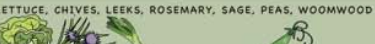

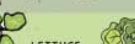


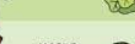

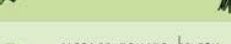




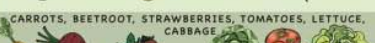


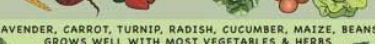
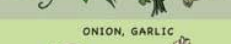





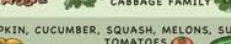

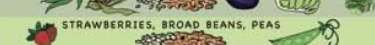




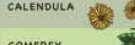



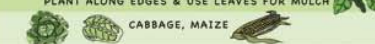
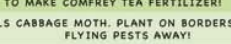
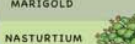
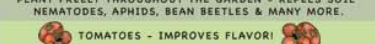
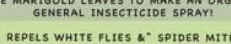





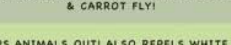
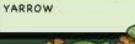





Organic Gardening

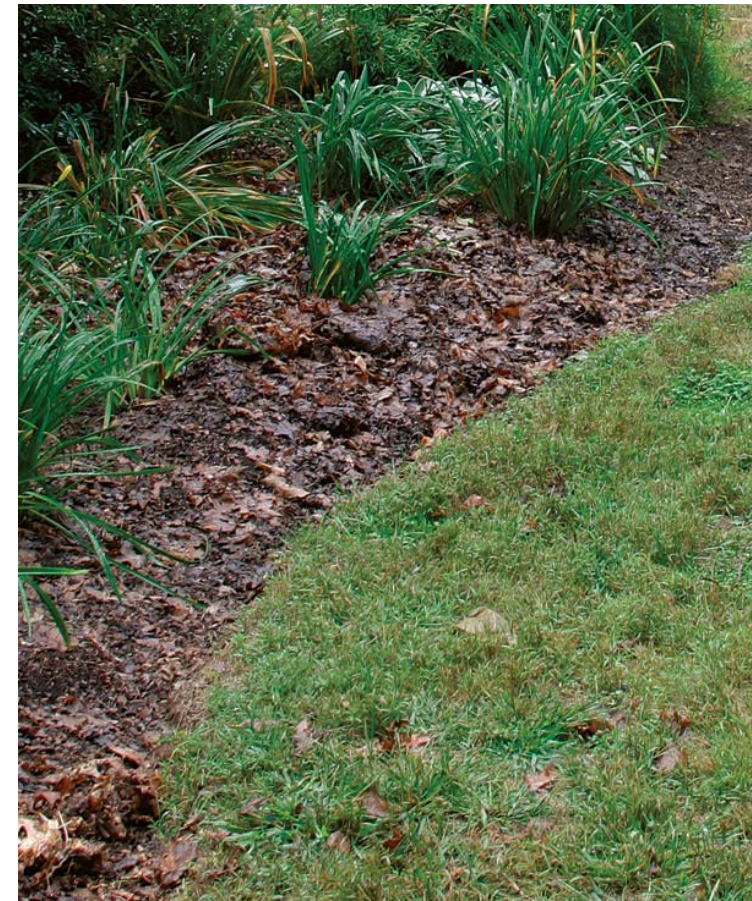
- ❑ No chemicals
- ❑ Soils are enriched with natural substances (compost, Liquid feeds, Green Manures, Seaweed)
- ❑ Work with nature (pollinators, soil insects, predators)
- ❑ Garden for other species and they will garden for you
- ❑ Low-tech
- ❑ Native local varieties
- ❑ Non-GMO
- ❑ Companion planting
- ❑ Crop rotation
- ❑ Cover crops, nitrogen fixers
- ❑ Mulches



COMPANION PLANTING

IN NATURAL ECOSYSTEMS, PLANTS PERFORM FUNCTIONS THAT CAN EITHER HELP OR PREVENT OTHER PLANTS TO GROW. THE SAME IS TRUE IN OUR GARDENS. CERTAIN PLANTS GIVE NUTRIENTS BACK TO THE SOIL, WHILE OTHERS NEED TO TAKE UP NUTRIENTS. PLANT AROMAS AND FLOWERS CAN ATTRACT POLLINATORS OR DETER PESTS. BELOW IS A CHART TO HELP YOU UNDERSTAND WHICH PLANTS GROW WELL TOGETHER AND WHICH TO PLANT FAR APART!

PLANT	GOOD COMPANIONS	BAD COMPANIONS
BEANS 	MAIZE, SUNFLOWERS, LAVENDER, CABBAGE, CUCUMBER, STRAWBERRIES, BRINJAL 	ONION, GARLIC, FENNEL 
BETROOT 	BEANS, ONIONS, GARLIC, LETTUCE, CABBAGE 	
BRINJAL 	CALENDULA, MARIGOLDS, MINT, PEAS 	
BROCCOLI, CABBAGE, CAULIFLOWER, KALE 	AROMATIC PLANTS, DILL, SAGE, ROSEMARY, POTATOES, BEETROOT, CELERY, GARLIC, ONIONS, GERANIUM 	TOMATOES, POLE & RUNNER BEANS, PEPPERS 
CARROTS 	LETTUCE, CHIVES, LEEKS, ROSEMARY, SAGE, PEAS, WOODWIND 	STRAWBERRIES, FENNEL, CABBAGE 
LETTUCE 	CARROTS, RADISH, STRAWBERRIES, CUCUMBER, BEANS 	CELERY, PARSLEY 
MAIZE 	SUNFLOWERS, AMARANTH, BEANS, PEAS, & OTHER LEGUMES, PUMPKIN, SQUASH, CUCUMBER, MELONS, & OTHER CUCURBITS, PARSLEY 	CABBAGE, TOMATO, CELERY 
ONION/ GARLIC 	CARROTS, BEETROOT, STRAWBERRIES, TOMATOES, LETTUCE, CABBAGE 	PEAS, BEANS, PARSLEY, LEEKS 
PEAS 	LAVENDER, CARROT, TURNIP, RADISH, CUCUMBER, MAIZE, BEANS, GROWS WELL WITH MOST VEGETABLES & HERBS 	ONION, GARLIC 
PEPPERS 	TOMATOES, GERANIUM, BASIL, CARROT, ONION 	BEANS, KALE, CABBAGE FAMILY 
POTATOES 	CORIANDER, MARIGOLD, BEANS, MAIZE, CABBAGE FAMILY, BRINJAL 	PUMPKIN, CUCUMBER, SQUASH, MELONS, SUNFLOWERS, TOMATOES 
SPINACH 	STRAWBERRIES, BROAD BEANS, PEAS 	POTATOES, FENNEL, CABBAGE FAMILY 
TOMATOES 	BASIL, OREGANO/ PARSLEY, CHIVES, NASTURTIUM, ONIONS, CARROTS, CELERY, CALENDULA, GERANIUM, BORAGE 	GENERAL PEST DETERRANT, PLANT THROUGHOUT GARDEN 
CALENDULA 	TOMATOES - REPELS TOMATO WORM! 	COMPOST ACTIVATOR. USE LEAVES TO MAKE COMFREY TEA FERTILIZER! 
COMFREY 	FAST-GROWING NUTRIENT ACCUMULATOR. PLANT ALONG EDGES & USE LEAVES FOR MULCH 	REPELS CABBAGE MOTH. PLANT ON BORDERS TO KEEP FLYING PESTS AWAY! 
CHILE PEPPER 	CABBAGE, MAIZE 	USE MARIGOLD LEAVES TO MAKE AN ORGANIC GENERAL INSECTICIDE SPRAY! 
MARIGOLD 	PLANT FREELY THROUGHOUT THE GARDEN - REPELS SOIL NEMATODES, APHIDS, BEAN BEETLES & MANY MORE. 	REPELS WHITE FLIES & SPIDER MITES 
NASTURTIUM 	TOMATOES - IMPROVES FLAVOR! 	DETERS CABBAGE WORM 
THYME 	CABBAGE 	DETERS CABBAGE MOTH, BEAN BEETLES & CARROT FLY! 
ROSEMARY 	CARROTS, CABBAGE, SAGE, BEANS 	KEEPS ANIMALS OUT! ALSO REPELS WHITE FLY 
WORMWOOD/ ARTEMISIA 	AROUND GARDEN EDGES 	PLANT NEAR AROMATIC HERBS TO ENHANCE ESSENTIAL OIL PRODUCTION 
YARROW 	PLANT FREELY THROUGHOUT THE GARDEN. REPELS SOIL NEMATODES, APHIDS, BEAN BEETLES, AND MANY MORE! 	



A DIVERSE GARDEN IS AN ABUNDANT GARDEN. HAPPY PLANTING!

Outdoor Classroom



Recycled Materials



Willow



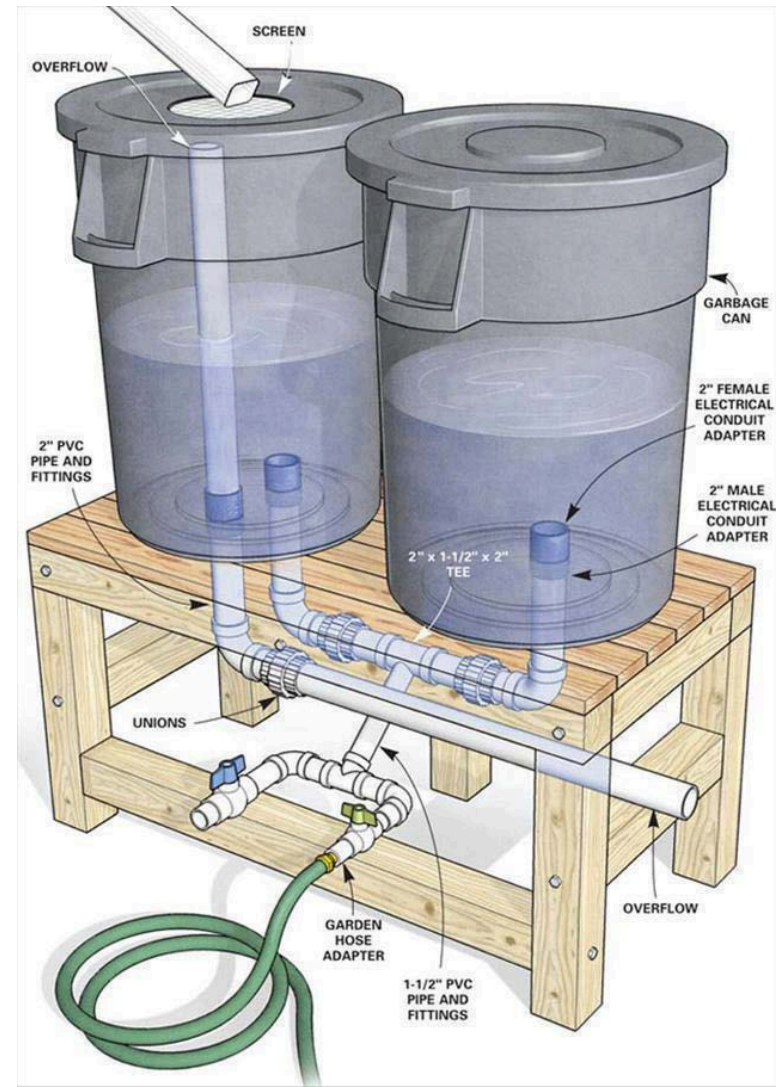
GB1



Water Conservation Garden

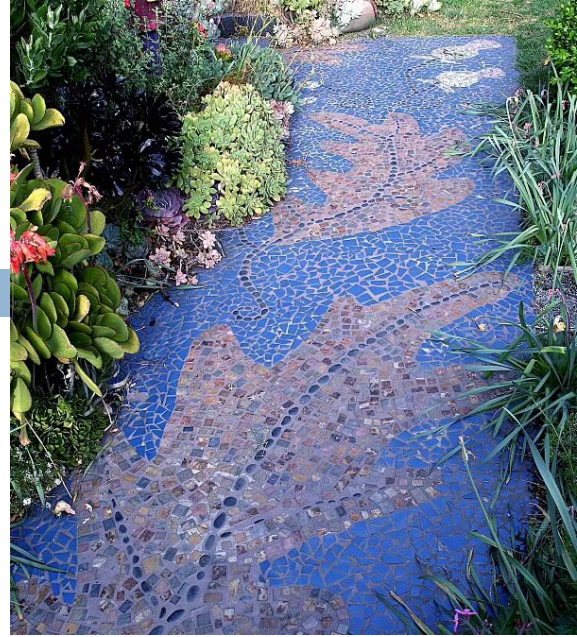
- ❑ Regularly check your outdoor taps, pipes and plumbing fixtures for leaks.
- ❑ Ban the hose!
- ❑ If you must water your plants, do it in the early morning or evening when it's cooler and only with a watering can, targeting only the plants that need water.
- ❑ Grass can survive for long periods without water and will quickly recover when the next rain showers arrive. Raising lawnmower blades to a higher level will help stop grass from scorching in warm weather. Leaving the clippings on the lawn protects roots and returns nutrients to the soil.
- ❑ Compost- Compost provides valuable nutrients and helps retain moisture in the soil.
- ❑ Mulches- Using mulch such as wood chips, bark or gravel will help prevent water evaporation and will suppress weed growth saving water and the need for weeding.
- ❑ Regularly weed and hoe your garden, to ensure that watering helps your plants and not your weeds.
- ❑ Trees, shrubs and plants- use plants that require less water or native plants that are adapted to the Irish climate. These will also encourage the maximum amount of native biodiversity into your garden.

Rainwater Collection



Using your skills

- Metalwork, woodwork, T-drawing, Art, Biology, etc.



The Design: Plan, Maintain, Enjoy 😊

1. Analyse your needs + wants
2. Analyse + Map your area for: Shade, light, slope, drainage, Wind, Temperature (Frost), access
3. Understanding your Soil
4. Matching your Plant stock to your garden conditions
5. Research, Research, Research !!!
6. Skills in the group, school and community
7. Make the Design
8. Fund-raising
9. Action Plan



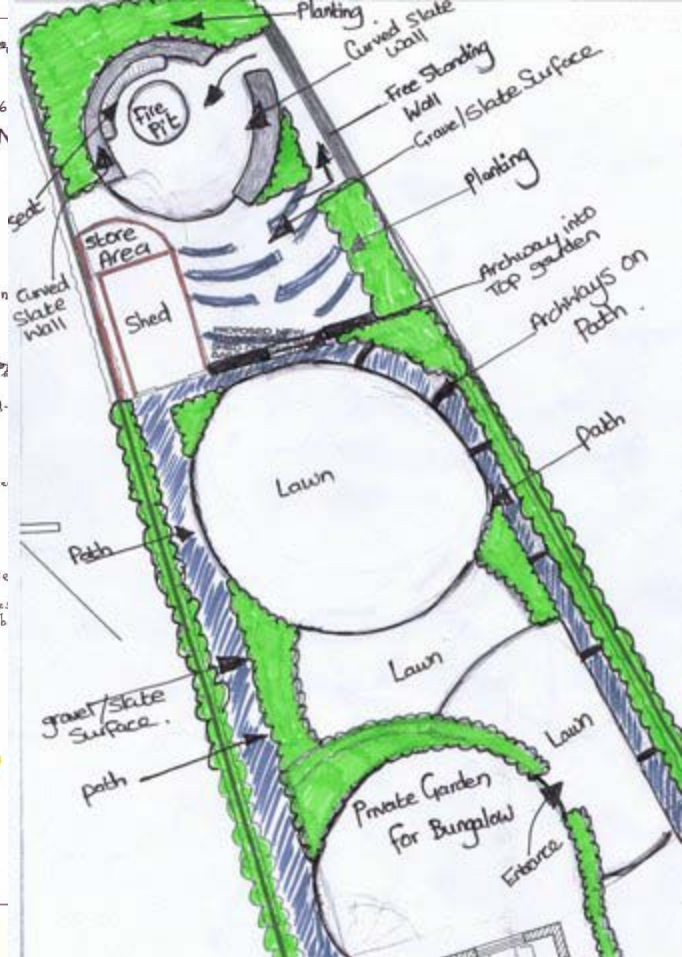
MALVERN EAST
5 APRIL 2009
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support trees to provide shade, wind-break, mulch, chicken fodder & fix nitrogen; species include tagasaste & selected acacias

selected support trees to be removed as orchard becomes established

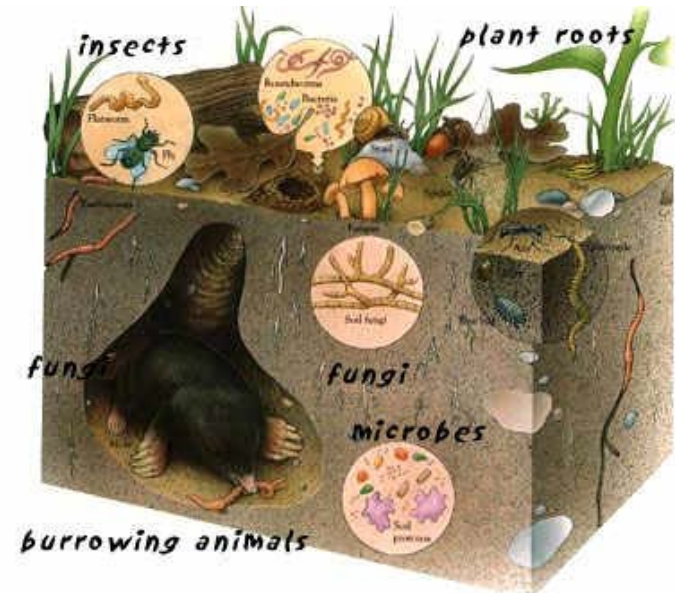
nasturtiums & comfrey planted as dense ground cover in orchard; comfrey is a vigorous deep-rooted herb whose leaves make an excellent mulch as well as a great chook food/medicine

water catchment from house, is fed to tank, via underground pipes; overflow is returned to storm-water drain.



Understanding your Soil

1. What soil do you have?
2. What type of plants would you like to grow
3. Match the plant to the soil type
4. Improve + maintain your soil fertility



pH test

- 0-14 (acidic<7>alkaline)
- You can have several different levels of pH in a garden
- Adjusting the soils pH - lime
- You can then pick plants that will survive and thrive in your soil conditions.



Start: Place soil in palm of hand. Add water drop-wise and knead the soil into a smooth and plastic consistency, like moist putty.

Does the soil remain in a ball when squeezed?

Yes

No

Add more water

Add dry soil

Yes

Yes

Is the soil too dry?

No

Is the soil too wet?

No

Sand

Place ball of soil in the hand, gently pushing the soil out between the thumb and forefinger, squeezing it upward into a ribbon. Form a ribbon of uniform thickness and width. Allow ribbon to emerge and extend over the forefinger, breaking from its own weight. Does the soil form a ribbon?

Yes

No

Loamy Sand



What kind of ribbon does it form?

Moisten a pinch of soil in palm and rub with forefinger

Does it feel very gritty?

Yes

Does it feel equally gritty and smooth?

Yes

Does it feel very smooth?

Yes

Forms a weak ribbon less than 1" before breaking

LOAM

Sandy Loam

Loam

Silt Loam

Forms a ribbon 1-2" before breaking

CLAY LOAM

Sandy Clay Loam

Clay Loam

Silty Clay Loam

Forms a ribbon 2" or longer before breaking

CLAY

Sandy Clay

Clay

Silty Clay

SOIL TEXTURE + STRUCTURE

Clay – does not drain easily, becomes water-logged, muddy and difficult to work with. Work in plenty of organic matter to improve drainage. Plus- nutrients don't drain away.

Silty – Like clay, more fertile

Sandy – Dry, loose water easily as they drain quickly so can become nutrient deficient. Benefit from mulching.

Peat soil – high in organic matter, acidic and damp.

Guide to Nutrient Deficiency Symptoms

HEALTHY leaves shine with a rich dark green color when adequately fed



PHOSPHATE shortage marks leaves with reddish-purple, particularly on young plants.



POTASH deficiency appears as a firing or drying along the tips and edges of lowest leaves.



NITROGEN hunger sign is yellowing that starts at tip and moves along middle of leaf.



MAGNESIUM deficiency causes whitish strips along the veins and often a purplish color on the underside of the lower leaves.



DROUGHT causes the corn to have a grayish-green color and the leaves roll up nearly to the size of a pencil.



Drawings Maynard Preece

DISEASE, *helminthosporium blight*, starts in small spots, gradually spreads across leaf.



CHEMICALS may sometimes burn tips, edges of leaves and at other contacts. Tissue dies, leaf becomes whitcap.



Enriching your Soil

- ❑ Lime
- ❑ Compost/Wormery
- ❑ Liquid feeds
- ❑ Green Manures
- ❑ Mulches
- ❑ Nitrogen fixers
- ❑ Crop rotation
- ❑ Cover crops

Crop Rotation

- ❑ Group 1: Potatoes, corgettes, pumpkins, tomatoes
- ❑ Group 2: Brassicas (cabbages, brussels sprouts, broccoli)
- ❑ Group 3: Root Crops (carrots, beetroot, parsnips)
- ❑ Cover crops (Clover)

Seeds

- Local varieties
- Organic / non-GMO
- Save seeds each year
- Swap seeds
- Buying compost , vermicillite
- www.seedsavers.ie or brown envelope seeds





Tools, Materials + Equipment



Compost bins



Making Ethical Decisions

- 1) Do I need it?
- 2) Can i make it?
- 3) Can i borrow it/buy it secondhand, recycled, reused, up-cycle, etc?
- 4) If i HAVE to buy, can i buy products that are sustainable, local, natural, fairtrade, organic, etc?
- 5) If i can't buy within these criteria, is there another solution i hadn't thought of?

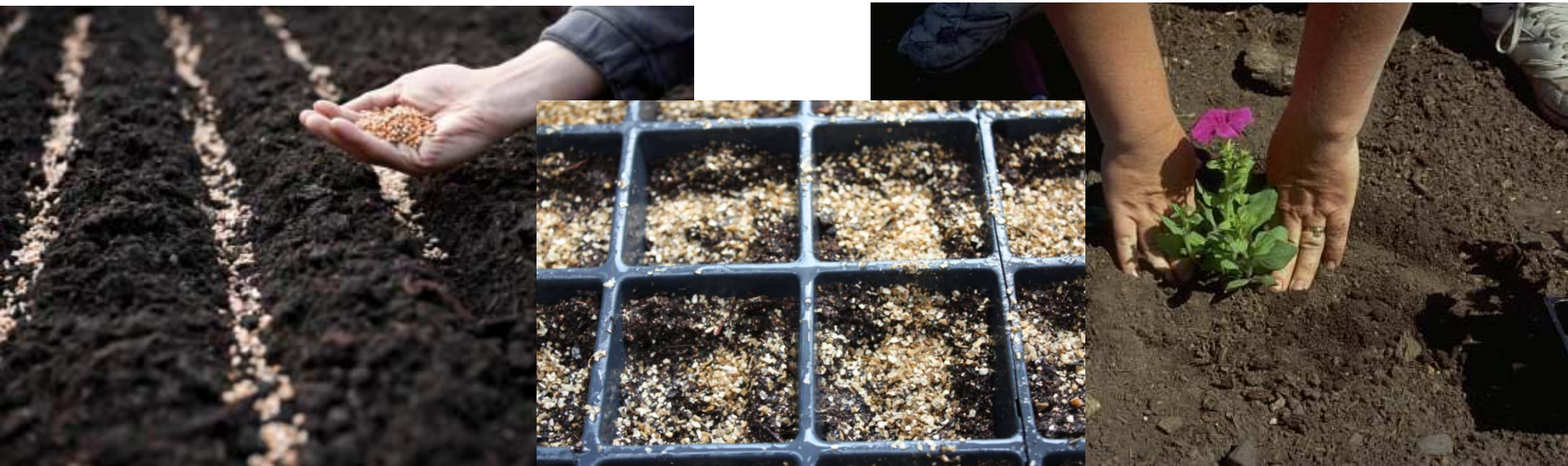
Ground Preparation

- ❑ Clearing the ground
- ❑ Marking out + preparing drills/raised beds, etc ensuring access without soil compaction
- ❑ Improving soil fertility (composting, manuring, liming, etc) – can depend on what you're growing
- ❑ Digging the seed bed- Forking, Raking + Levelling



Sowing Seeds or Transplanting

- Sowing seeds outdoors (Not too early, not too deeply, not too thickly), Thinning
- Compost- Peat free, local, recycled, organic?
- Vermiculite
- Grow + Transplanting from container (compost, cover, warmth, light + water, Prick out, Harden off to prepare for outdoors)



Maintaining the Garden

- Watering
- Feeding
- Pruning
- Mowing
- Weed-control
- Pest + Disease control

Weeds

- What is a weed? Takes up space + stops other plants from growing
- Weeds are pioneer species + some surprisingly beneficial
- Weeding (Gloves!!!) Can be composted as long as they havnt seeded, diseased plants
- Mulching

Pests

- ❑ Slugs, snails, beetles, caterpillars, weevil, aphids, rabbits...
- ❑ Predators: ladybirds, hoverflies, wasps, carabid beetles, spiders, birds, etc. All prefer to inhabit a natural ecosystem
- ❑ Monocultures!!!
- ❑ By hand, physical barriers (traps, barriers, woodchips, copper wire, eggshells)
- ❑ Biological control

Diseases

- Identify: Fungal, bacterial, viral or disorder?
- Causes: Fungal (warm, damp conditions), Bacterial (through wounds), Viral (vectors), Disorder (deficiencies)
- Good garden hygiene, ventilation, avoid overwatering, resistant varieties.
- LAST RESORT: Permitted Pesticides, fungicides (insecticidal soap, sulphur, rapeseed oil, etc)

Harvesting

- Share and enjoy!!!



**GROWING
CHANGE**