GROWING FOOD

Autumn 2012

A Guide to Organics, Biodynamics & Permaculture for the Home, Garden, Allotment & Field

EAT MY WORDS

Ediculture

SESSIONS / SECTIONS

1. **INTRODUCTION** **Ediculture**

2. **SOIL** **Improvement**

3. **FERTILITY** **Humus and Concentrates**

4. **SITES and DESIGN** **Infrastructure**

5. **CROPS** **Timing and Season Extension**

6. **PLANT HEALTH** **Pests and Diseases**

7. **CULTIVATION** **Strategies / Techniques**

8. **PROPAGATION** **Growing Media / Herbs**

9. **FRUIT** **Planting & Maintenance**

10. **HARVESTING** and **SEED SAVING**

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A Definition of Organic.

1. *Organic Matter*:-

Biological / Living / Animate / Natural / Biotic

2. *Organic Vegetables*:-

Natural / Non-artificial / Non-chemical / Pesticide-free / Additive-free

3. *An Organic Whole*:-

Structured / Organised / Ordered / Harmonious

100 FORMS OF GARDEN

front-garden	back-garden	organic-garden	herb-garden
fruit-garden	secret -garden	kitchen-garden	cottage-garden
flower-garden	roof-garden	victory-garden	peace -garden
vegetable-garden	health-garden	leisure-garden	permaculture-garden
garden of Eden	water-garden	bog-garden	fantasy-garden
English country-garden	forest-garden	pleasure-garden	dye-garden
annual-garden	edible-garden	food-garden	market -garden
vegan-garden	compost-garden	eco-garden	biological-garden
kinder-garden	prison-garden	fertile-garden	no-dig-garden
cook's-garden	gourmet-garden	green-garden	community-garden
farm-garden	landscape-garden	winter-garden	ornamental-garden
cactus-garden	historic-garden	walled-garden	mediterranean-garden
nutritional-garden	medicinal-garden	physic-garden	apothecary's-garden
Hanging-garden of Babylon	nature-garden	wildlife-garden	miniature-garden
rock-garden	Japanese-garden	biodynamic-garden	astrological-garden
formal-garden	royal-garden	sacred-garden	magic-garden
mulch-garden	special needs-garden	monastery-garden	meditational-garden
lazy-garden	terraced-garden	family-garden	play-garden
scented-garden	fragrant-garden	perfume-garden	sensory-garden
night-garden	*seasonal-garden*	*terrarium-garden*	*public-garden*
Kew-gardens	botanic-garden	memorial-garden	private-garden
garden-centre-garden	container-garden	chemical-garden	anti-garden
hydroponic-garden	zero gravity-garden	concrete-garden	city-garden
estate-garden	country house-garden	rose-garden	herbaceous shrub-garden

allotment / plot / potager / dacha / orchard / patio / yard

T.V.-CHEQUEBOOK-HIT AND RUN MAKEOVER-GARDEN

SPECTRA / POLARITIES

ORGANIC	**<**	**>**	**SYNTHETIC**
ADDITION	<	>	**OMISSION**
NATURAL	<	>	**ARTIFICIAL**
BIOLOGICAL	<	>	**CHEMICAL**
ECOLOGICAL	<	>	**ECONOMIC**
SUSTAINABLE	<	>	**DESTRUCTIVE**
RENEWABLE	<	>	**FINITE**
INTEGRATED	<	>	**SPECIALISED**
APPROPRIATE	<	>	**DISRUPTIVE**
DIVERSE	<	>	**MONOCULTURE**
CYCLICAL	<	>	**WASTE**
SYMBIOTIC	<	>	**PARASITIC**
CLEANSING	<	>	**POLLUTING**
BENIGN	<	>	**HARMFUL**
QUALITY	<	>	**QUANTITY**
SUBSTANCE	<	>	**APPEARANCE**
PROBIOTIC	<	>	**ANTIBIOTIC**
SUBSIDIARISED	<	>	**CENTRALISED**
LOCAL	<	>	**GLOBAL**
AUTONOMY	<	>	**COERCION**
INTERDEPENDENT	<	>	**DEPENDENCY**
INDIGENOUS	<	>	**TOURIST**
PEASANT	<	>	**UBERCLASS**
PAGAN	<	>	**URBAN**
DO IT YOURSELF	<	>	**COMMERCIAL**
GENERALIST	<	>	**SPECIALIST**
AUTONOMOUS	<	>	**COLLECTIVE**
DIVERSE	<	>	**CONFORMIST**
EMPIRICAL	<	>	**VIRTUAL**
ANALOGUE	**<**	**>**	**DIGITAL**
VISCERAL	**<**	**>**	**VICARIOUS**

ORGANIC IS MORE OF A RELATIVE, THAN AN ABSOLUTE.....

A BRIEF GUIDE TO ALL YOU NEED TO KNOW TO GROW

BIODYNAMICS

A farm or garden in which all the nutrients produced are recycled needs very little extra input from outside. Composting all available organic wastes and returning them to the soil creates resource loops which maintain the biomass in the system. In this way, the soil is maintained in a high state of fertility and is more active or dynamic.

COMPOSTING

The decomposition and reconstitution of organic matter includes all four elemental processes; Heating = Fire, Breathing = Air, Moisture retention = Water, Humus formation = Earth.

The essential factor is the bonding of Carbon- and Nitrogen-containing molecules, which requires a balanced initial mixture of ingredients, in a ratio of 30 to 1 (10 to 1 at end of process).

ORGANISMS

Healthy, well-fed soil has an awesome capacity for supporting life. A spoonful of healthy topsoil contains billions of micro-organisms. Earthworms can create tonnes of fertilising casts per acre each year. The presence of abundant micro- and macro-organisms not only encourages healthy plant growth but also limits the spread of pests / diseases.

RAISED BEDS

A strip of soil 4-8 ft (1-2 m) wide is edged with beams or planks of wood 6-12 inches (15-30 cm) high to make a stable bed. Soil from paths can be dug out onto the beds to allow access and prevent cultivated soil from being compacted. This helps to create soil which is well-structured, easier to work, holds moisture with good drainage and aeration.

MULCHING

Mulches protect the topsoil around maturing plants from weathering by sun, wind and rain. They provide a buffer at the interface between the soil and the atmosphere, keeping it moist in dry weather or warm in cold weather, allowing roots and soil organisms to remain active for longer.

GREEN MANURES

Ground-cover crops are a living mulch which can prepare land for the crop to follow. They suppress weed growth and can either be dug in to improve soil-structure or raked away for use in compost or as mulch.

Green Manuring will help to improve soil structure and workability, essentially taming a new or wild soil. It also protects improved soils from weeds or erosion. It saves time and effort for the grower, since the plants' roots are working for you. Essential in stock-free and less-dig methods.

COMPANION PLANTING

Neighbouring plants of different species and growth patterns can have a beneficial influence on each other. Herb companions improve vegetable flavour and protect crops from pests. Two crops symbiotically benefit from growing next to or amongst each other, if they require similar soil cultivation but make different demands on the space available at different times. In Permaculture systems, plant combinations (Guilds) suitable for a particular site create a self-sustaining living community.

CROP ROTATION

Monoculture of the same crop on the same piece of land for many years depletes the soil of the nutrients which that crop requires and increases the chances of pests and diseases building up. A sequence of different crops allows the soil longer to recover before the same demands are repeated.

Compost or manure only needs to be added once every three years for heavy feeders [potatoes or cabbage] if they are followed by soil-improvers [peas, beans, grains] and lastly light-feeders [roots] that need a well-consolidated soil.

PLANT CARE

Liquid feeds and foliar sprays with readily available nutrients can be made by fermenting any green plant material, [especially comfrey for potash and nettles for nitrogen] or manures in rainwater for 2-4 weeks, stirring occasionally.

Teas made of infused herbs can be sprayed onto plants either to strengthen new growth [such as horsetail] or to discourage pests [such as quassia].

Biodynamic preparations containing homeopathic doses of quartz, cow-dung, valerian, chamomile, dandelion and oakbark can be sprayed onto plants, soil or compost to enhance a variety of growth processes.

CYCLIC SYNCHRONICITY

Plants are influenced by daily cycles of expansion by day and contraction at night and also by annual cycles of seasonally changing day-length, both depending on the position of the sun relative to the earth. The lunar cycle also influences the activity levels and life-cycles of plants and soil-organisms, peaking around full moon. Plants are even affected by planetary transits.

We can synchronise our actions with these daily, monthly and annual cycles by understanding and observing how they influence growth.

OBSERVATIONS

Many factors influence plant growth. We need to observe and understand these influences to be able to assist in these processes and avoid disrupting them. An awareness of daily and seasonal changes allows us to intervene only when our actions will be effective. A strategy of minimal intervention saves time and effort, and produces great results.

So try to regularly put your thinking cap on, relax and use the passive, receptive side of your brain to assess how these observable factors can help you grow plants where and when they will thrive.

SOLAR ENERGY

The amount of sunlight available to plants varies according to day length and season. Plants need to both expand by day and contract at night. Cells formed at night are actually larger, because they are not baked by the heat of the sun.

The relative length of light and dark periods determines when seeds will germinate and when plants will flower and mature. In the spring and autumn, these periods are equal allowing relatively constant growth.

In summer, sunlight is more intense, direct and almost vertical, which can be too bright, hot and dry for some plants. Equally in the winter, sunlight is weaker and less direct, casting long shadows, which can be too dark cold and wet for many plants to keep growing.

TEMPERATURE

The air temperature usually [but not necessarily] reaches a maximum by day and falls to a minimum at night. It is affected by wind which can either be cooling or warming. Cold air is heavier than warm and so sinks down slopes which causes frost pockets in dips and valleys.

The temperature of the soil slowly changes with the seasons, with an average delay of six weeks behind the ambient air temperature heated directly by the sun. At a certain depth, below 6 inches (15 cm), the temperature of the soil remains within a fairly constant range [2-4^{o} C] throughout the year. Darker soils warm up earlier in the year.

Some plants have anti-freeze mechanisms which increase the concentration of glucose in their sap and allow them to continue to grow in sub-zero temperatures and others can even generate enough heat to protect themselves from mild frost.

Soil organisms can also generate warmth [exothermic reactions], given the right conditions, as illustrated by the heat achieved in active compost or manure heaps.

CLOUD *Clouds reduce the intensity of light reaching plants, but many can grow quite happily with only indirect sunlight. If it's cloudy enough, the cloud-cover actually insulates the air beneath it, which usually prevents frost at night. By regular observation, you can recognise what weather different shapes and sizes of cloud-systems will bring.*

You can study the unique pattern that your local geography produces in the cloudscape, which allows you to time your actions precisely. If you know your clouds, it should be possible to sow seed just before it rains.

PRECIPITATION

Water is vital for plants, especially in these times of drought. Rainwater is preferable to tap water, so you should try to store as much as possible in butts and tanks. You can also store a lot of moisture in the soil if it contains sufficient humus [over 5%], which acts like a sponge, soaking up and retaining up to ten times its weight in water.

You can also conserve moisture in the soil by either hoeing or mulching directly after a downpour. A layer of snow forms an insulating blanket which actually keeps the soil underneath it relatively warm.

WIND

I*t is possible to briefly summarise the nature of winds from the four directions of the compass thus; East wind = Continental, West = Oceanic, North = Polar, South = Mediterranean.*

Try to notice how the strength and direction of the wind changes with the seasons and what effects these changes have on your specific gardening site. Nearby mountains, buildings and trees create local wind-flows and channels. The best windbreaks are non-solid, permeable barriers such as hedging which slow the wind down, rather than solid objects such as walls which compress and accelerate the wind to even greater speeds, creating dangerous eddies and vortices.

LUNAR PHASES

The 29 ½ -day moon cycle has the same gravitational effect on the land as it does on the seas and oceans. The water in soils, plants and even animals is subtly pulled up and pushed down twice a day by the changing force of the moon's gravitational field as it orbits the earth.

At full and dark moons, this tidal effect is greater, which encourages extension growth [shoots and roots]. At half-moons, soil water rises and falls less, consolidating the growth made before. Try to sow around the start of the second waxing quarter moon, which allows the seeds to be influenced by the expansive full moon. Transplant during the fourth quarter [old / waning moon] to allow plants' roots to gently re-establish under the influence of the dark moon.

SOIL TYPES

CLAY *feels like Velvet*

Ground-up rocks and minerals. Finest particle size. Heavy. Slow to warm
Fertile. Wide range of nutrients / trace elements. Released long-term.
Feels sticky. Consists of flat platelets compressed together, which are prised apart by addition of Lime (flocculation) and bonded with organic matter to form Humus / Topsoil.

1. **Blue-grey** = Nutrients locked up
   Wet / bad drainage / Anaerobic / Eutrophic / Acid.
2. **Red - Yellow** (*Iron oxidised*) = Free-draining / Aeration / Sweet

SILT / ALLUVIAL (Valley / Delta) *Silky*

Mineral and organic particles washed from higher ground by rain.
Uniform / undifferentiated soil profile. Drains badly.
Fertile, but addition of manure/compost will improve structure / drainage.
Feels silky smooth, dark, stains hands.
Prone to compaction so keep cultivated and covered with green manure.

SANDY *Gritty*

Warms up quickly in spring, especially if darkened with organic matter.
Feels coarse and gritty. Relatively large particles allow roots to penetrate.
Very free-draining. Dry in summer, nutrients leach in winter.
'Hungry' soil requiring lots of compost, manure, leafmould and mulches
Keep mulched or green manured when not in use.

CHALK / LIME *Lumpy*

Thin, dry, 'hungry' soil. Feels dry and crumbly, looks grey-white.
Rapid draining, nutrients leach easily.
Easy to work, but shallow so avoid digging subsoil and make raised beds.
Demands lots of organic matter. Mulching and green manuring essential.
Alkaline soil, so add acidic materials. Once improved, good for brassicas.

PEAT *Bitty*

Infertile. Low in nutrients. Often waterlogged and acidic.
Spongy, dark, warms easily when drained. If dried out is slow to re-moisten.
Fibrous physical properties encourage extensive root growth.
Requires added nutrients and conditioning with lime especially calcified seaweed or magnesian limestone.

SOIL

Healthy Topsoil contains (*by Volume)*

50% Solids + 25% Water + 25% Air

SOLIDS (by Weight) =

95% Minerals + 5% Organic Matter

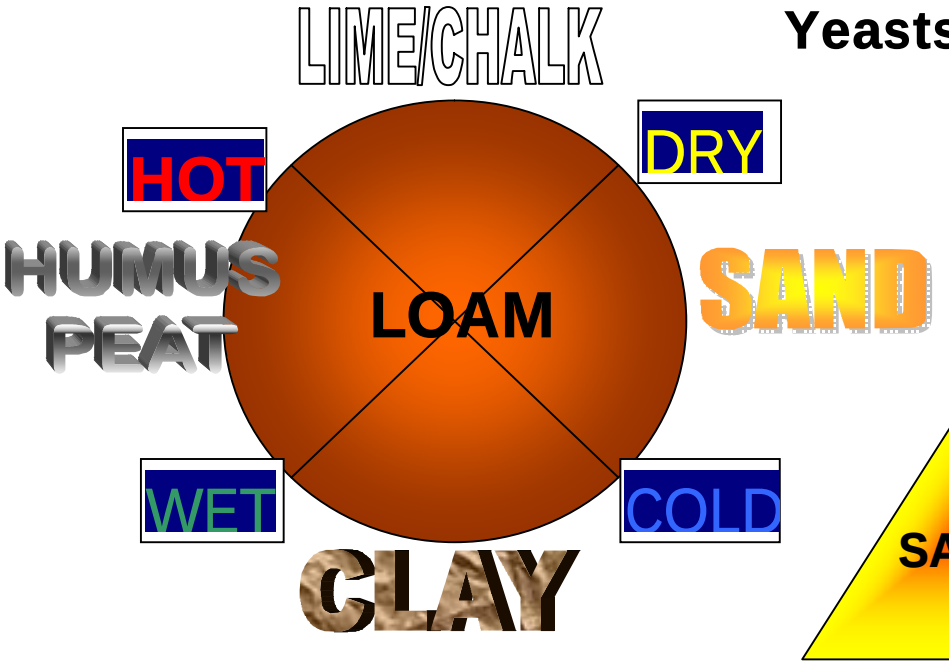
ORGANIC MATTER (by Weight) =

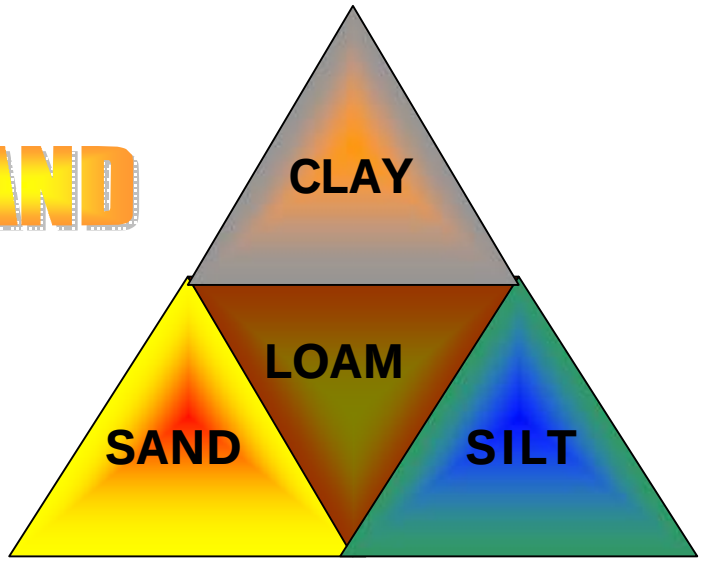
85% Humus +10% Plant Roots +5% Organisms

ORGANISMS (by Weight) = 40% Algae / Fungi
+ 40% Bacteria / Actinomycetes (slime moulds)
+ 2% Earthworms + 8% Other Insects

per gram

Bacteria = 1,000,000,000
Slime Moulds = 10,000,000
Fungi = 1,000,000
Protozoa = 1,000,000
Algae = 100,000
Yeasts = 1,000





5 – 10 % humus content + combinations of soil types leads to light / medium / heavy **LOAM**

SOIL ABUSE on a scale from 1 to 10

Classification of forms of soil abuse, ranging from the least to the most dangerous.

Links the health of the soil, plant-health and human health

1. **BAD ATTITUDES.** Inappropriate or negative expectations can produce self-fulfilling prophesies which can contribute to the disfunction of attempts at cultivation. Trying to impose a certain form of planting on a site for which it is not suited.

2. INAPPROPRIATE INFRASTRUCTURE

BAD SITE LAYOUT. Hard landscaping producing conditions unsuitable for soil health/ plant growth. Shady, boggy, sloping.

PRESENCE OF DELETERIOUS MATERIALS. Likely to degrade producing negative impact on soil ecology, such as synthetics, plastics, woodchip, painted wood.

INAPPROPRIATE PLANTING. Presence of established perennials such as privet, rhododendron, Japanese knotweed, Russian vine or mature trees such as sycamore which will invade and monopolise large areas of soil, to the exclusion of other plants, by competition for water and nutrients and/or by actively repelling them by root secretions.

3. SIMPLE NEGLECT

UP TO ONE YEAR. Seeding of annual weeds and establishment of perennial weeds [docks, dandelions].

2-5 YEARS. Several cycles of annual and biennial weed growth and seeding. Establishment and dominance of mature perennials [nettles, brambles]. Juvenile sapling bushes and trees [willow, hawthorn, buddleia].

OVER 5 YEARS. Overgrown becoming shrubby scrub, juvenile woodland.

4. SOIL LOSS

EXTRACTION, REMOVAL OR PROCESSING OF TOPSOIL. Without replenishing with loam, organic matter.

EXCESSIVE EXPOSURE TO THE ELEMENTS. Bare soil producing losses to leaching by rain and decreased soil life at the surface by bleaching in the sun.

LOWERED BEDS. Effectively produces raised paths and sunken beds after continuous removal of weeds, turf and crops over an extended period. Increases waterlogging, decreases mean soil temperature and micro- and macro-organism activity.

COMPACTION. Excessive pressure too often over long periods, such as by trampling or use of vehicles, destroys soil structure and dynamism and prevents healthy interaction at surface between soil and air. Increases likelihood of soil being washed away and gullied during heavy rain.

5. CULTIVATION METHODS

INADEQUATE ORGANIC MATTER INPUT to replenish that extracted.
Humus content should be maintained at or above 5% by volume.
INSUFFICIENT DIVERSITY OF INPUTS. Imbalances and shortages of certain chemical components due to prolonged extraction.
INAPPROPRIATE TOOLS.
Rotavators producing impermeable hardpan after repeated use.
EXCESSIVE CULTIVATION.
Too often or too deep destroying topsoil and subsoil structure.

6. MISTREATMENT

EXTENDED MONOCROPPING. MINERALISATON. ACIDIFICATION.
DENITRIFICATION. DEHUMIFICATION.
For instance by presence or application of coal or woodash.

7. OCCASIONAL TOXIC EXPOSURE

Producing the necrosis, migration and decline of soil organisms.
APPLICATION OF CHEMICAL FERTILISER, PESTICIDE, HERBICIDE, FUNGICIDE
SPRAY-DRIFT, ATMOSPHERIC AND AIRBORNE POLLUTION.

8. INERT OR MECHANICAL CONTAMINATION.

Relatively harmless except when disturbed.
BUILDING WASTE. Rubble, mortar, cement, bricks.
GLASS. Especially broken.
PLASTICS. Degraded by exposure to ultraviolet sunlight.
METALS. Especially if degrading, e.g. rusty.
CARCINOGENS. E.g. used oil.
ASBESTOS. Dust from dry, freshly fractured blue asbestos lethal.

9. PERSISTENT TOXIFICATION

Lethal if ingested. Uptake in plant metabolism.
LONG-TERM BIOCIDES. E.g. Heavy metal contamination such as mercury.
OVER-FERTILISATION. E.g. Nitrate blooms de-oxygenate watercourses.
INDUSTRIAL DUMPING, LEACHATES AND RUNOFF.
LANDFILL REACTIONS AND EMISSIONS. Mixed organic and inorganic waste cocktails

10. TOTAL TOXIC OVERLOADS

TERRESTRIAL CATASTROPHE Pinatubo/ Mount St. Helen's
CHANGES TO WEATHER PATTERNS. Greenhouse, ice-age. El Ninjo.
EXTRATERRESTRIAL CATACLYSM. e.g. Comet strike.
NUCLEAR WINTER / RADIOACTIVE FALLOUT.
e.g. Chernobyl affecting Welsh pasture /sheep on Benbecula.

“WEEDS”

Only a problem when they set seed
or are allowed to spread.

Measure of neglect –
Annuals 1-2 / Biennials 2-5 / Perennials 5-10

PROTECT SOIL

- Roots bind the soil and prevent erosion
- Indicate soil acidity-alkalinity / texture / history

IMPROVE FERTILITY

- Accumulate Minerals and promote nutrient cycles
- Fallow restores soil balance

HELP PLANTS

- Moisture retention, drought protection
- Attract predators

TIPS:

SOIL IMPROVEMENT - Adding organic matter and fertilisers will change the nature of the soil and the types of weeds it supports.

LOAM – Stack weeds and their roots for a year to create fibrous and fertile topsoil

EDIBLE WEEDS – When your soil is clear of pernicious weeds and their seeds, you can allow cultivars (either edible like mustards or beneficial like marigolds) to set seed in situ which then out-compete any weed seeds.

WEEDS (from Mea Allan)

1. As INDICATORS of soil quality and conditions -

Acid: Spurrey / Corn Chamomile / Henbit / Sheep's Sorrel / Wild Radish / Black Bindweed / Mercury / Common Storksbill / Shepherd's Purse

Alkali: Mouse-Ear Chickweed / Fumitory / Corn Poppy / Wild Carrot / HoaryPlantain / Night-Flowering Campion

Neutral: Forget-Me Not / Coltsfoot / Milk-Thistle / Mayweed / Curled Dock / Creeping Thistle / Goosegrass / Yarrow / Penny Cress / Sun Spurge / Poppy

2. As ACCUMULATORS (Stores and Providers of Elements)

Nitrogen:
Bindweed / Dock / Chickweed / Clovers / Creeping Thistle / Dandelion / Fathen / Groundsel / Knotgrass / Purslane / Redshank / Sow Thistle / Nestle / Vetches / White Campion / Yarrow

Calcium:
Coltsfoot / Corn Chamomile / Creeping Thistle / Daisy / Dandelion / Fat Hen / Goosegrass / Plantain / Horsetail / Purslane / Scarlet Pimpernel / Shepherd's Purse / Silverweed / Nettle

Potassium:
Dock / Buttercup / Chickweed / Coltsfoot / Couch / Fat Hen / Great Plantain / Purslane / Nettle / Tansy / Thistles / Tufted Vetch / Yarrow

Phosphorous:
Dock / Buttercup / Fat Hen / Purslane / Vetch / Yarrow

Iron: Buttercup / Chickweed / Chicory / Coltsfoot / Crosswort / Creping Thistle / Dandelion / Fat Hen / Plantain / Ground Ivy / Groundsel / Horsetail / Silverweed / Nettle

Copper:
Buttercup / Chickweed / Coltsfoot / Thistles / Dandelion / Plantain / Nettle / Vetch / Yarrow

Magnesium: Chicory / Coltsfoot / Daisy / Horsetail / Plantain / Yarrow

Boron: Spurges

Cobalt: Buttercup / Horsetail / Plantain / Rosebay / Tufted Vetch

Manganese: Buttercup / Chickweed

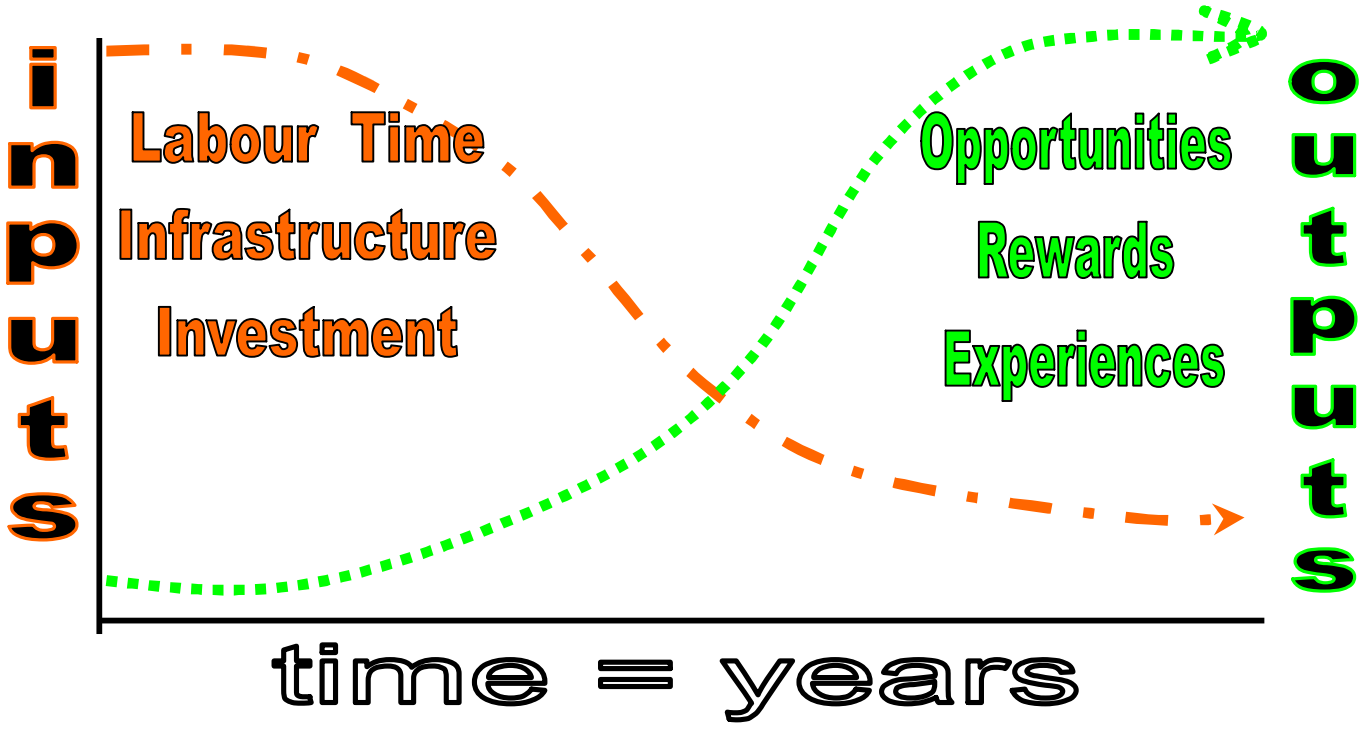
Silica: Horsetail / Couch / Plantain / Knotgrass / Netle

Sulphur: Coltsfoot / Fat Hen / Garlic / Purslane

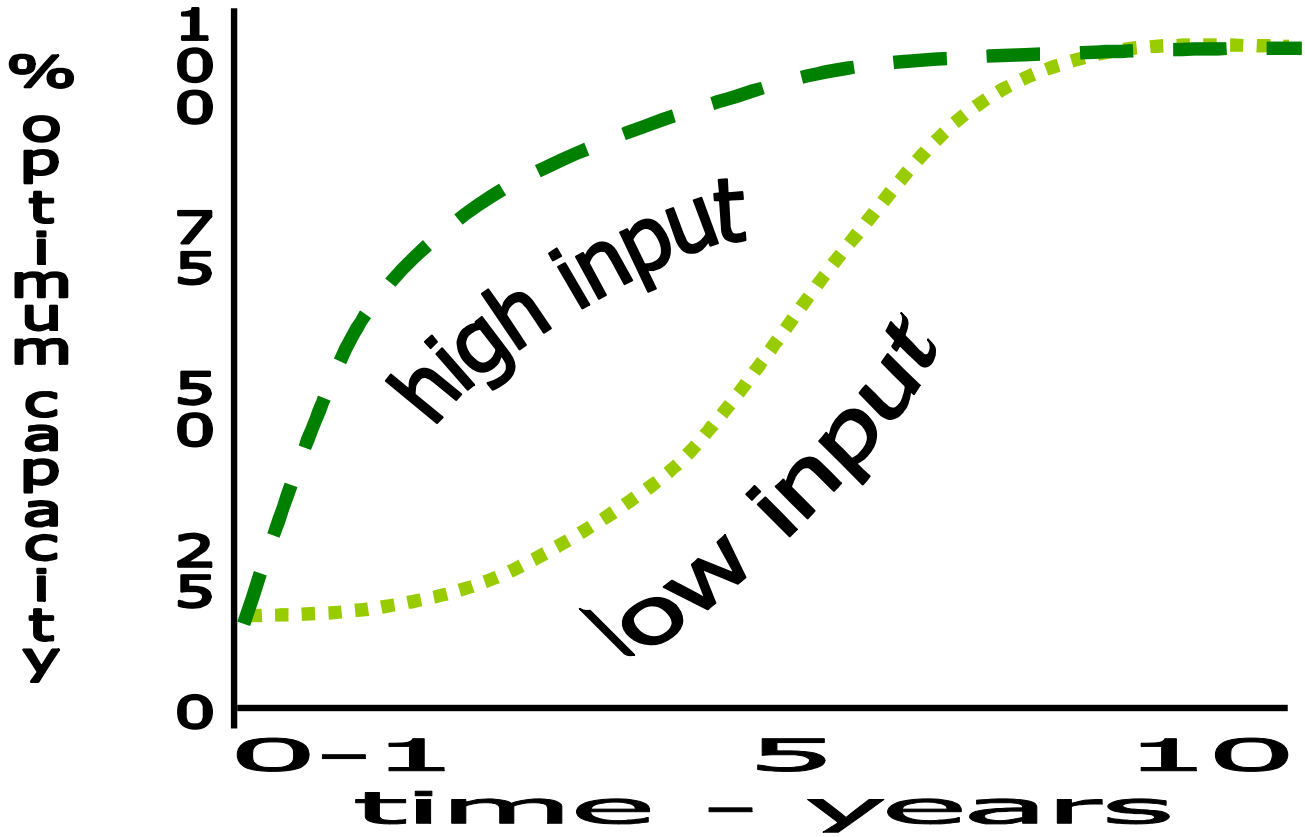
3. Defiencies (from RODALE ENCYCLOPEDIA OF ORGANIC HORTICULTURE)

MINERAL	DEFICIENCY SYMPTOMS	ACCUMULATORS	SOURCES
BORON	Dwarf / Heartrot / Stemcrack	Melon / Clover / Vetch	Granite
CALCIUM	Blackheart / Tipburn / Endrot	Worms / Brassica	Bonemeal/Gypsum/Lime
CHLORINE	Wilting / Stubby Roots	Any Green Plant	Rainwater
COPPER	Dwarfing / Dieback	Dandelion / Spinach / Tobacco	Sawdust
IRON	Chlorosis / Anaemia	Any Green Plant	Soil
MAGNESIUM	Mottled Leaf / Blotchy Flower	Any	Dolomite / Lime / Talc
MANGANESE	Stunted / Chlorotic / Poor Leaf Colour	Alfalfa/Carrot	Leafmould
MOLYBDENUM	Necrosis of Leaf-Edges	Alfalfa / Vetch	Phosphate
SULPHUR	Slow Growth / Leaf Necrosis	Cabbage / Legumes	Gypsum / O.M.
ZINC	Poor Fruit / Dieback	Corn / Ragweed / Vetch	Manure

Investment and Return cycle



Fertility Budget / Strategies



A BRIEF GUIDE TO THE RELIGIONS OF THE WORLD

TAOISM	**Shit happens.**
HINDUISM	**This shit happened before.**
CONFUCIANISM	**Confucius he say, "Shit happens".**
BUDDHISM	**If shit happens, it isn't really shit.**
SHINTO	**Shit happens punctually.**
ZEN	**What is the sound of shit happening?**
ISLAM	**Shit happening is the will of Allah.**
JEHOVAH'S WITNESS	**Knock, knock, shit happens.**
PAGANISM	**Shit happens when the moon is full – let's dance.**
JAINISM	**Don't tread on that shit.**
ATHEISM	**There is no shit happening.**
AGNOSTIC	**I don't know if shit happens or not.**
ABORIGINE	**I dreamt that shit happens.**
PROTESTANT	**Shit won't happen if I work harder.**
CATHOLIC	**If shit happens, I deserve it.**
ANIMISM	**Shit's alive and happening.**
JUDAISM	**Why does this shit always happen to us?**
NATIVE AMERICAN	**Buffalo shit happens.**
NEW AGE	**I affirm shit will not happen.**
RASTAFARIAN	**I and I roll this shit up and smoke it.**
COMPOSTERS	**Give me more shit to put on the heap.**
ORGANICS	**Eat fresh, local shit and we'll save the world.**

FERTILITY - Soil Improvement

1. HUMUS - Bulky Organic Matter / Compost

5 – 10% soil volume

Physical - Biological - Chemical

LEAFMOULD – Structural for Seeds / Cuttings / Root growth
Minimal nutrients as neutral base for growing media

Spectrum of Manures

Phosphorous	**< Nitrogen >**	**Potassium**
Hot / Dry	***Warm / Moist***	***Cold / Wet***
Avian / Birds	Ruminant / Herbivore	Cloven / Omnivor
Chicken / Goat	Cows / Horses	Pigs / Humans
Herbs / Seeds / Oils	Leaves / Greens	Roots / Fruit
Rock Phosphate	Nettles / Urine	Comfrey
Bonemeal	Dried Blood	Fish Meal

2. CONCENTRATES - Soil Conditioning

e.g. LIMING -> pH 6.5 - 7

Chemical - Physical - Biological

Break Clay / Converts to Topsoil – Consolidate physical effort
Magnesium – Chlorophyll (as Iron – Haemoglobin)
Stimulates Bacteria

3. FERTILISERS - Nutrition

Biological - Chemical - Physical

Soluble Nutrients / Slow-release / Long-term Remineralisation
e.g. Seaweed / Hoof & Horn / Volcanic Rock Dust

USING **SEAWEED** TO GROW HEALTHY ORGANIC FOOD

Seaweed is a safe, pleasant and easy to use organic fertiliser.
It contains trace elements and nutrients for plant health and Gels [alginates] which help form humus and improve the soil's structure and texture. It also improves the taste and flavour of the final crop. Seaweed contains IODINE which helps your THYROID system.

1. Compost activator **1 kg per m ^{3}**

Sprinkle on in layers as the heap is built up and moisten.
Improves the quality of composts and manures.
Accelerates the breakdown of compost ingredients and time to maturity.

2. Soil improver **1 kg per 4 m ^{2}**

Spread evenly 4-8 weeks before crop sown or planted.
Improves texture, structure and water retention capacity.
Increases micro-organisms, humus and nutrients available to roots.

3. Crop fertiliser. **1 kg per 2 m ^{2}**

Spread around established plants 4-8 weeks before crop matures.
Gently hoe or rake to mix seaweed into top inch of soil.
Helps plants attain full potential even where space is limited.

4. Liquid feed. **1 kg per 25 l**

Ferment in [rain-]water for 2-4 months, stir weekly.
Dilute fermented liquid with 20 parts water before use.
Apply to soil which is already moist around maturing crops.

5. Foliar spray. **1 kg per 5 l**

Ferment in [rain-]water 4-6 months. Stir regularly. Dilute 1:10.
Improves plant's vigour and health at all stages of growth.
Effective against pests and for recovery of distressed plants.

6. Potting compost ingredient. **1+ kg per 50 l**

Distribute well in mixtures for potting on plants and seedlings.
Omit all fertilisers from seed-sowing composts.

These application rates are approximate, but generous. Use a little more if seaweed is the only fertiliser you use. Use less if you combine several methods of application [1-6] or if you also use other fertilising materials.

HEALTHY SOIL = HEALTHY PLANTS = HEALTHY PEOPLE

GROWING for TASTE and NUTRITION

The following list of soil conditioners and fertilisers describes materials that feed the soil as much as the plants, creating and maintaining **humus-rich soils** full of beneficial bacteria, micro- & macro-organisms, a balanced pH-level, and the essential physical characteristics of water retention, drainage, aeration, friability**.**

Chemical fertilisers provide the basic nutrients for a plant to grow, but contribute nothing to the quality and condition of the soil. Indeed, some chemical fertilisers create the unintended effects of killing off worm populations and acidifying the soil. As consumers, we often find the resultant crop tasteless, or worse, unpleasant, especially in the case of tomatoes or potatoes, for example. The condition and vitality of the soil is all important to the health of plants; a poor soil laced with chemical fertilisers will grow a crop which has unbalanced growth, making crops liable to damage from environmental stress resulting in disease / pest attack.

The following materials are all commonly used in organic growing systems, and all can be obtained commercially or made domestically to current organic standards. Most can be obtained from sustainable sources and some are acceptable to vegetarian and vegan growers.

The more diverse a range of materials going into the compost heap and onto the soil, the more one can expect healthy and flavoursome foods.

SEAWEED MEAL :

Sustainably harvested from north Atlantic Ocean. The best all-round organic fertiliser and compost heap activator. Contains good amounts of nitrogen, phosphorus and potassium (~ 2.8/0.2/2.3) plus the other macro-nutrients, such as calcium, magnesium and sulphur. Also a vast array of the micro-nutrients so essential to optimum plant health, such as iodine, selenium, iron, copper, zinc, sodium and boron.

Seaweed meal also consists largely in **alginates** or gels, substances used in laboratories for growing bacterial cultures in petri-dishes. This ability of alginates to encourage and accelerate the growth of bacteria makes seaweed an excellent compost activator, improving the quality and reducing the time to maturity of the compost. When applied to the soil, the alginates feed soil bacteria and micro-organisms, helping to bind the soil into stable **humus compounds.**

There is strong anecdotal and mounting scientific evidence that use of seaweed can have a tonic effect, helping plants overcome environmental stress and attack from pests and diseases; food crops develop optimum flavour and stay fresh in storage for longer.

CALCIFIED SEAWEED (Marl) :

This is ground up coral sustainably harvested from the coasts of France and Britain. As it consists almost 50% **calcium** it has a similar sweetening effect on acid soils as lime, but unlike chemical, hydrated lime, it is unlikely to 'burn' plants, or lock-up essential nutrients, and cannot raise the pH much above pH 6.5, thereby avoiding the danger of overdosing.

It also contains up to 10% **magnesium** carbonate, **magnesium** being an essential for chlorophyll and photosynthesis. Calcium is also highly biochemically

reactive, 'feeding' the soil bacteria and promoting the activity of nitrogen-fixing bacteria in legume crops.

Calcified seaweed also contains a broad spectrum of trace elements, revivifying overworked, abused soils. Its sweetening effect can be put to good purpose in the compost heap; a light dusting every 20 cm if many of the materials are acidic (i.e. lots of rotting fruit & veg.); also a light dusting in worm bins every 20 cm keeps conditions sweet; the calcium is required by worms to aid reproduction/egg-laying.

DOLOMITE / MAGNESIAN LIME:

Alternative to Calcified Seaweed, containing 60% calcium carbonate and 40% magnesium carbonate, especially beneficial on acidic, heavy clay soils

- Raises pH to a level (~6.5) that makes nutrients available to the majority of food plants, without the danger of overdosing, unlike common, hydrated or 'garden' lime, which, if over-applied, has the chemical effect of 'locking-up' a number of vital macro-nutrients.

- Feeds bacteria that create humus, which in turn creates a physically improved soil (water retention and drainage; friability), and a soil capable of holding onto plant nutrients over a long period.

-Supplies magnesium, which is involved in production of chlorophyll, part of the process of photosynthesis.

PLASTER (Calcium Sulphate)

Can be distributed as a long-term improver for heavy clay soils. Crops should not come into contact for at least six months, while plaster is chemically reacting in the soil.

DRIED BLOOD:

Slaughter house by-product. Will not 'burn' foliage like chemically-synthesized equivalents. Dried blood consists mainly of protein, and as such provides **nitrogen**; for many of the more demanding crops, and crops that have to be grown quickly (salads), its use can make a big difference in yield and quality.

Note that dried blood ought to be used during the main growing season only (March/April til end August). Either side of this period will result in **unbalanced growth**, encouraging pests and diseases, or waste, as the plants are insufficiently active to take up the product. The season is extended somewhat within the environment of a warm greenhouse or polytunnel, and this can be taken into consideration.

BONEMEAL:

Slaughter house by-product. Horticultural grades are steam-sterilised,. Bonemeal is a good supplier of **phosphorus**, plus some nitrogen. Phosphorus is essential in plant sugar metabolism, and therefore in the development of flower, fruit and seed.

When planting fruit trees, dig in up to ½ Kg in the planting hole.

HOOF & HORN :

Slaughter house by-product. Contains nitrogen as a hard protein, broken down slowly in the soil by bacteria and released over a long period of time. Also contains a

small amount of phosphorus. Hoof & horn is an excellent fertiliser to add to planting holes for fruit trees and bushes; it promotes early vigour, helping the plant adapt to its new conditions, and to grow a strong framework of branches that will support heavy, healthy crops in the future.
Hoof and horn is also useful for the more demanding vegetable crops that require heavy feeding, especially if grown in containers. For vegetables, apply only at the beginning and height of the growing season; overly lush,'**soft' growth** on over wintering varieties makes them prone to frost damage.

ROCK PHOSPHATE :

A non-slaughterhouse derived form of phosphorus. Often combined with calcified seaweed, since the availability of phosphorus decreases in soils with a pH under 6.5. It is released more slowly than bonemeal as it takes a longer time to break down in the soil.

VOLCANIC ROCK DUST :

Especially useful material if one is attempting to revitalise tired or abused soils, as it will be slowly broken down by the available soil bacteria, releasing a vast array of trace elements.

Overworked soils that have become thin and lifeless as a result of lack of organic matter and use of chemical fertilisers, lack a number of vital trace elements. A combination of **double-digging** and the addition of plenty of compost can resurrect a soil in a couple of years; the use of rock dusts greatly helps this. For quicker breakdown and optimum use of small quantities, add volcanic rock dust to the compost heap where it will be combined into stable humus molecules.

BULKY ORGANIC MATTER

LEAFMOULD Most useful as key ingredient of seed sowing and potting composts, or growing media. But since at leaf-fall it is so freely available, and not valued by many gardeners (who remain addicted to peat - an inferior material for most purposes), it is possible to collect enough to use as a soil improver and conditioner.

MANURES

To fix the most humus from manure, and to make good garden compost, it is best to put as much manure through the compost heap as possible. The more concentrated, nitrogen-rich manures act as **compost activators**, feeding bacteria.

The manure of any herbivore (even human!) can be used, but unlike most of the above-mentioned materials, it is far from a standard product, and is available in many forms and conditions: E.g; Cow manure may have been well stacked, and occasionally turned, and been obtained from a conscientious farmer with healthy stock. Conversely the manure may have been frequently rain-drenched, compacted, and have come from unhealthy stock reliant on doses of antibiotics etc...

The more concentrated manures, such as chicken, pigeon and sheep, can be used as liquid feeds; E.g. Half a hessian sackful suspended in a barrel of rainwater and fermented for several weeks, and applied at a dilution of about 20:1. It is especially good for crop quality to liquid feed with manure appropriate to the growing stage of the crop.

LEAFMOULD Soil Improver and Growing Media.

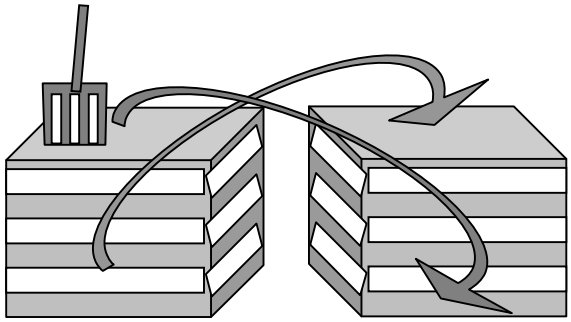
1. COLLECTION Oct to Nov. Dry leaves weigh a lot less than wet.
Deciduous preferable to Evergreen, which take longer & are acidic.
Use a hay rake and 1-tonne builder's sacks. NOT Blowers
Visually check and remove any plastic, glass or metal.
Shredded leaves – Do not dig in
Only use as a surface mulch (still contain growth-suppressants)

2. STACKING Spread out until leaves are moist (max surface area)
Flatten each layer as you add more leaves, up to 2m / 7 foot high.
Separate from other Bulky Organic Matter (Manure/Compost/Loam)

Stage 1. **HEATING / PASTEURISATION** (1-3 months)

Specialist *Thermophilic* bacteria digest residues on surface of leaves.
CRITICAL MASS = 5 m^3 (8 foot cube) will insulate material inside.
40^o C (i.e. above body heat) can be maintained if the heap is **moist, aerated and insulated** (i.e. turned).
Add fine dusting of **Lime** (Magnesium) to stimulate micro-organisms
Add liquid **Nitrogen** (Urine) when heap is hot, to feed bacteria.
Small amounts (i.e. Bin Bags) will not heat up and take 18 months to break down (Lack of Air / Water preserves leaves.)

3. TURNING Heap needs water if dry.
Will soon settle excluding air
Fork **upside-down** / **inside-out** to spread warmth throughout.
Turn regularly – twice a week.

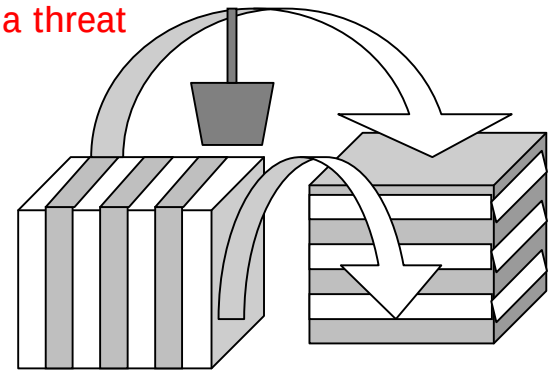


+ COVERINGS Plastic retains condensation. Carpet retains heat.

Stage 2. ***ACTINOMYCETES*** (3- 12 months)

Slime-moulds (hybrid Fungi + Algae) digest Cellulose 6-12 months.
Beware fruiting bodies (dark brown / amorphous) in summer
Spores taste of chocolate but small particles are a threat

4. CHOPPING
Chop through vertically + sharp spade.
After 6 Months, use as general mulch or dig in to rough / heavy soil.
12 months, add to potting composts.



5. RIDDLING
Save sticks and stones for Drainage in large pots or for Cuttings.
Bag and store Leafmould dry for future use. Will keep indefinitely.

COMPOSTING

- **BULKY ORGANIC MATTER`** (equal proportions of...)
  1. Retail Vegetable Waste 2. Crop Residues 3. Cattle Manure
- **SMALL AMOUNTS** 1. Hay / Straw 2. Paper / Card
  3. Nettles / Comfrey 4. Annual Weeds / Perennial Weeds (Tops Not Roots)
- **ADDITIVES** 1. Seaweed Meal 2. Volcanic Rock Dust
  3. Magnesium Lime 4. Compost Activator (Urine 9% Nitrogen)
- **INNOCULANTS** 1. Loam / Topsoil (Micro-Organisms)
  2. Mature Compost (Compost worms + Eggs + Microbes)
  3. Biodynamic Preparations (Homeopathic Doses)

SITE Base area = 7 ft x 7 ft / 2 m x 2 m Height = 7 ft / 2 m
Right-angled walls / boarding + temporary dividing boards (pallets etc.)
Soil or loose brick floor (drainage + firm chopping surface)
Heap supported on three sides / front open for loading

Chopping vegetable waste using ***sharp*** spades. Especially matter which will re-grow (onions /beetroots etc.), resist breakdown -citrus or is woody -brassica stalks / avocado / mango

STACKING

1. Bottom layer spongy, dry material (e.g. hay / straw): to soak up leachate + firm stems to support material above and allow air to be drawn into the base of the heap
2. Alternating layers of bulky organic matter (3-6 inch / 10-15 cm) + additives.
3. Insulate raw material (veg / hay) by putting manure at the edges of the heap.
4. Flatten each layer so that it is horizontal.
5. Firm up front to build a near-vertical face.
6. Add intractable materials to upper layers, the hottest part of the heap.
7. Top dome-shaped (parabolic) so that condensation evaporates.
8. Capping top with soil to insulate and innoculate.

COVERINGS: 1. Soil, Paper or Card to soak up water vapour
2. Plastic sheet to retain moisture and ammonia gas
3. Carpet to insulate and retain heat

TURNING INVERT and RESTRUCTURE INSIDE-OUT and UPSIDE-DOWN.

FIRST TURN (using forks) after 2-4 weeks. Heap will reheat to 40^{o} C
SECOND TURN (using spades) to chop through heap in 3 inch / 10 cm slices after 4-6 weeks.
Less heat / maturation phase / innoculate with mature compost

ARRANGMENT OF COMPOST AREA:
Heaps next to each other to permit worms to migrate from mature to recent heaps.
STOCKPILING: A backlog of heaps left to fully mature for 6-9 months+.

1. SIZE Insufficient material piled at the same time. Thermal insulation
If the volume of material is less than 1 m^3, there will not be sufficient critical mass to generate the chain reactions of microbes which produce heat.

2. **BALANCE OF INGREDIENTS** Excess amounts one type in initial mix.
3. **TURNING** To extend thermophilic breakdown and homogenise ingredients.
4. **BOXES** Sides too open allows wind to dry out material at edges.
5. **COVERINGS** Must be sufficient to retain heat and moisture.

1. DECOMPOSITION BY MICRO-ORGANISMS 6-8 weeks

Bacteria, fungi, yeasts, algae, protozoa and actinomycetes break down the raw materials and feed off each other. Successive flushes of micro-organisms spread through the heap. Heat is produced in the insulated environment of the heap by thermophilic bacteria.

2. RECOMPOSITION BY MACRO-ORGANISMS 3-9 months

The longer stage of maturation by worms (Eisenia Foetida) digesting the material broken down by micro-organisms and forming it into improved, stable HUMUS (*Vermicomposting*).

USES 3 MONTHS (after Decomposition) --- Mulch / Surface dressing / Don't dig in
6 MONTHS (Recomposition beginning) --- Incorporate into soil
9-12 MONTHS (after Vermicomposting) --- Any use including potting mixes

APPLICATION RATES: 5-10% OF SOIL VOLUME / 5-10 METRIC TONNES PER ACRE, depending on crop and soil quality. The more mature a compost is, the more stable humus it will contain and the easier its fertility will be taken up by plants' roots.

THE CARBON TO NITROGEN RATIO (C:N)

Chemically, the composting process can be understood as the combining of carbon and nitrogen to form complex carbohydrate proteins which will bond onto clay particles to form humus.
Ideally, the initial mix should contain about 30 times more carbon than nitrogen.
Mature compost will end up with 10 times more carbon than nitrogen.

HUMUS MOLECULES can hold ten times more water than an equal amount of sand.

MICRO-ORGANISMS. Populations of several billion per teaspoonful.

Some soil bacteria **(NITROBACTERS)** specialise in digesting nitrogen.

Topsoil or loam can be used to **deodorise** boots and bins covered in smelly, slimy material.

PHAGES Viruses consume Bacteria. Treat infections in antibiotic resistance.

SEASONS. Spring and autumn (the Equinoxes) are better times for composting than summer and winter (the Solstices) because the temperature is neither too hot nor too cold, and the weather is neither too wet nor dry. During March - April and September - October, composting will be faster and more vigorous. Airborne spores which also innoculate composts are more prevalent in Autumn.

BALANCE. The composter should try to combine the greatest diversity of inputs possible to maximise the health and vigour of the compost and the growth-potential and flavour of the plants it fertilises. If the initial combination of materials is balanced, the whole process will be optimal. One way to conceive of this is to try to provide all that is needed mechanically for the process: aeration or ventilation, moisture-cycling by evaporation and condensation and insulation to retain heat. This could also be thought of as a balance between the elemental forces: fire, earth, air and water; or between the four humors: hot, dry, cold and wet. With this in mind, a judgment can be made about how varying inputs will affect the mix. For instance, different manures can be categorised according to whether they are hot and dry (like strawy horse manure), cold and wet (pig / human) or balanced (cattle).

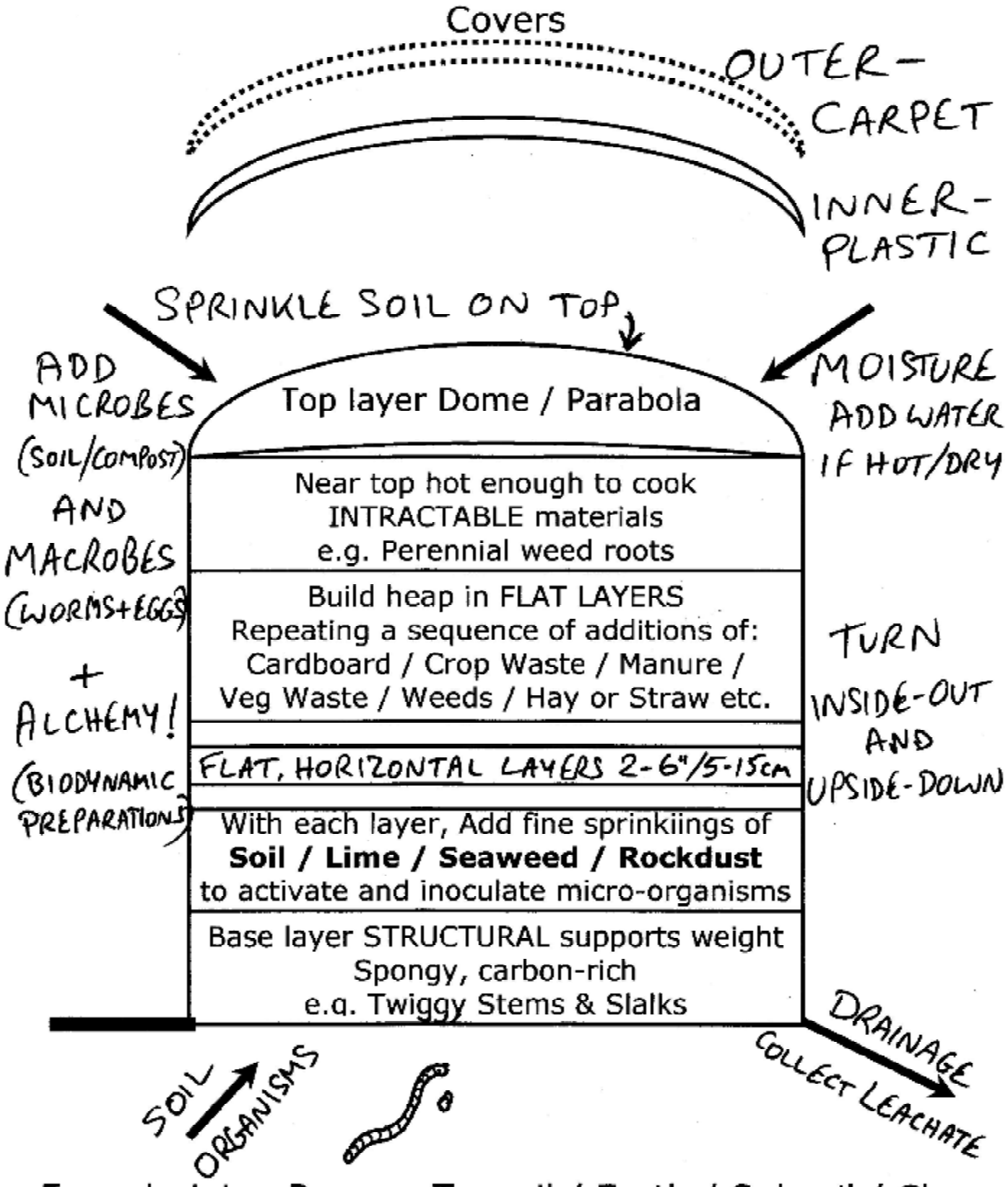
BIODYNAMICS. A system of ultra-organic horti-/agri-culture which acknowledges the existence of subtle natural energies and advocates sensitive cultivation in harmony with these influences. Planting with the moon (sow seed before full / transplants or cuttings before dark). Preparations used to innoculate compost heaps contain homeopathic doses of
Yarrow, Chamomile, Nettles, Oak-bark, Dandelion Quartz, Manure and Valerian,
each of which improves the environment for specific micro-organisms and processes.

ALCHEMY. Composting has often been described as an alchemical process of converting base materials into higher, more valuable forms. It can be used to transmute substandard, diseased, inorganic and contaminated matter into organic-standard humus to feed and improve the health of soils, the plants that grow in them, and in turn, the humans that eat their produce.

MATURE COMPOST is DARK, CRUMBLY, SWEET-SMELLING.

Create a Compost Organism

Size 4-6 Ft / 1.5-2 m Wide and High
(Same profile longer = Windrow)



TURNING HEAPS

Compost / Manure / Leaves

1

DECOMPOSITION

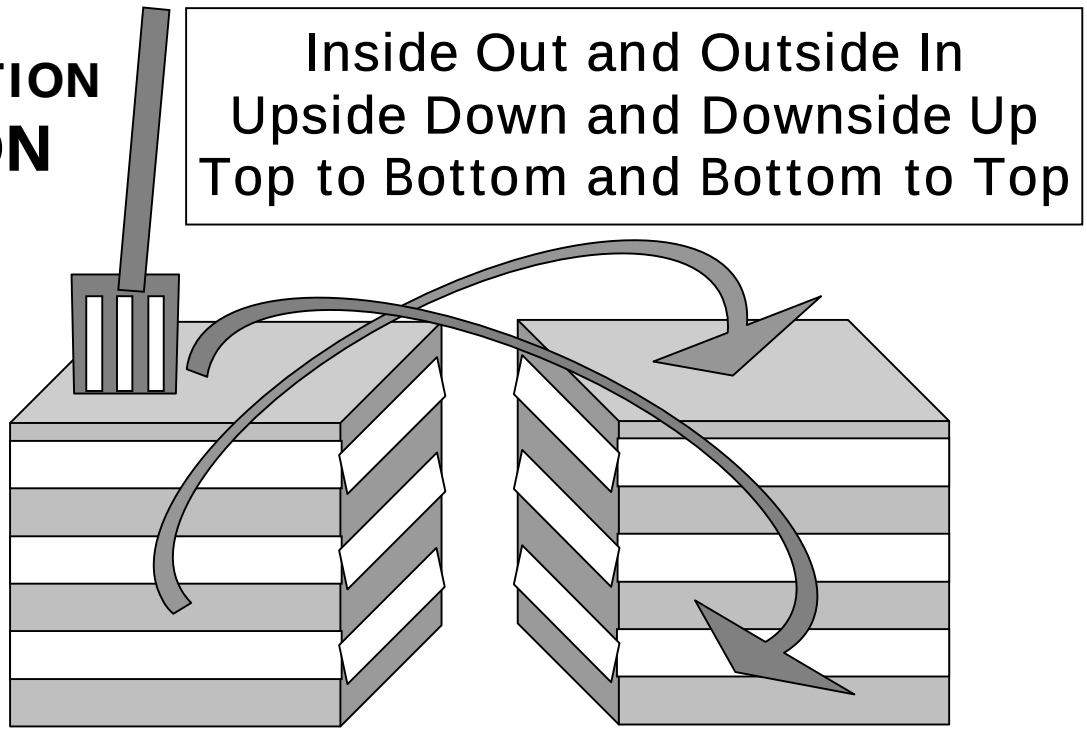
INVERSION

using a

FORK

When Heap $>1m^3$

HOT



2

RECOMPOSITION

CHOPPING

with a

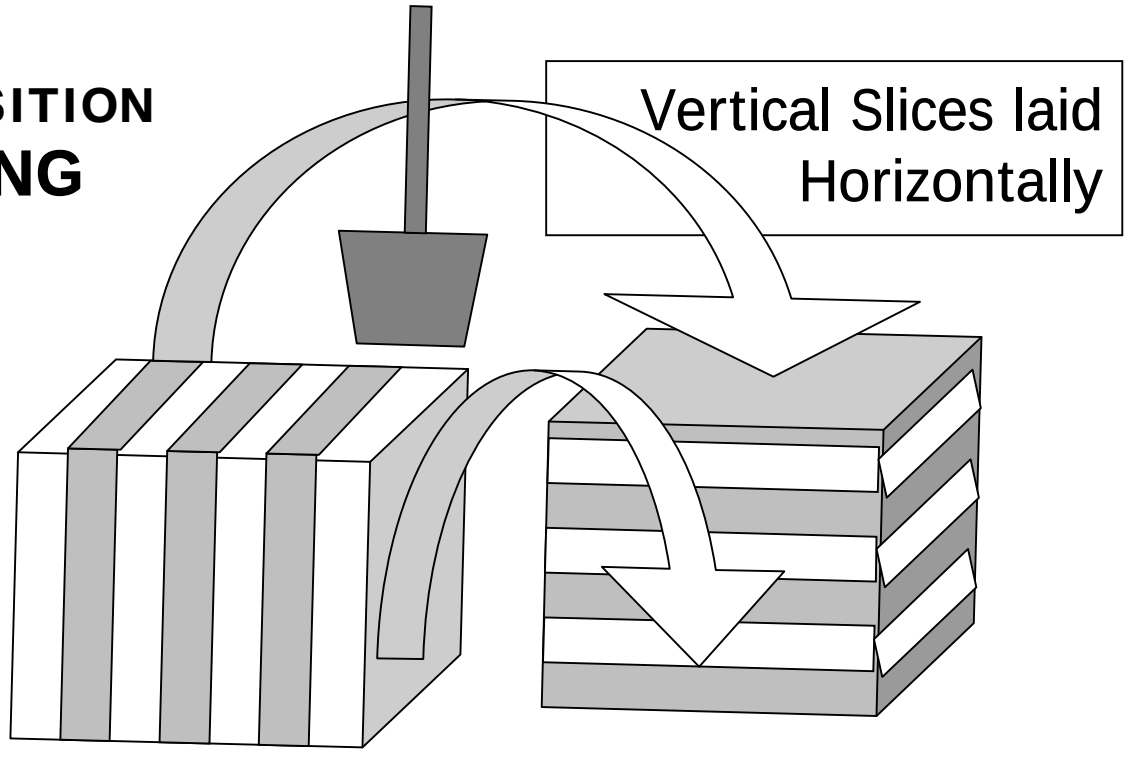
(**sharp**)

SPADE

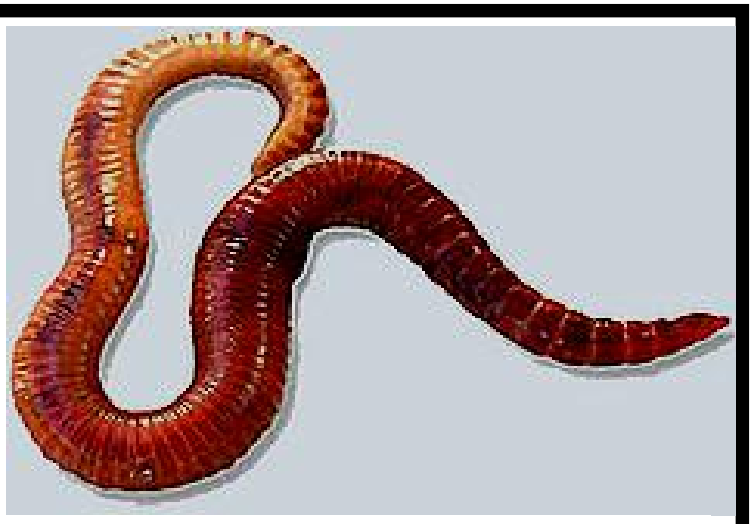
When

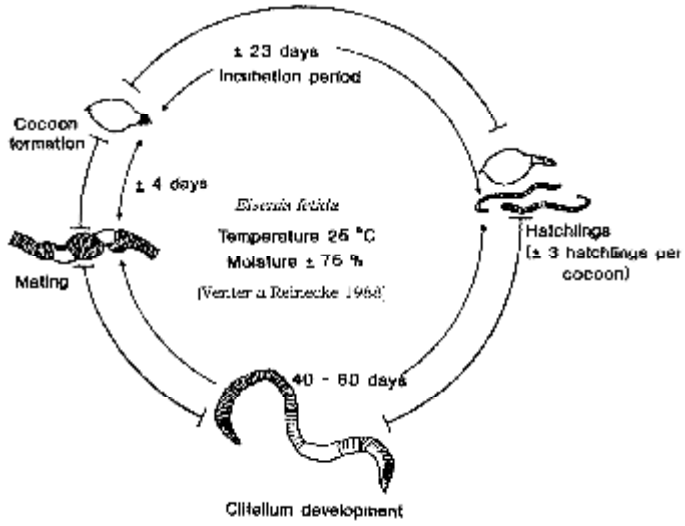
COOL

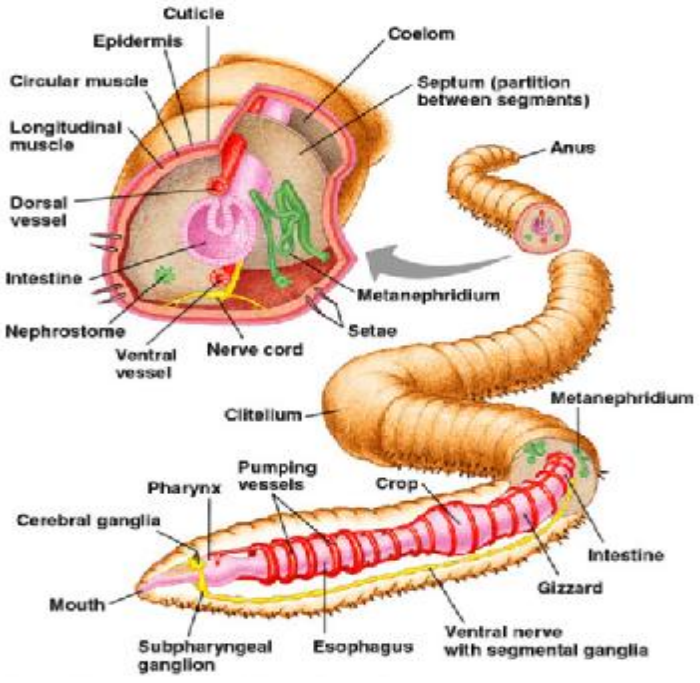
3 - 6 months



Vermi-culture *Eisenia Foetida*







Worm-cast = Humus

Grind Organic matter, Clay and Grit.

Feed at surface and Nest at bottom.

Prefer rotting, decaying slimy Mush.

Consume their own body weight in food every week.

3 Months to Reproduce.

After 6-9 months, Harvest worms, by spreading compost on a plastic sheet, to start a new cycle.

Migrate towards Food Using sense of smell.

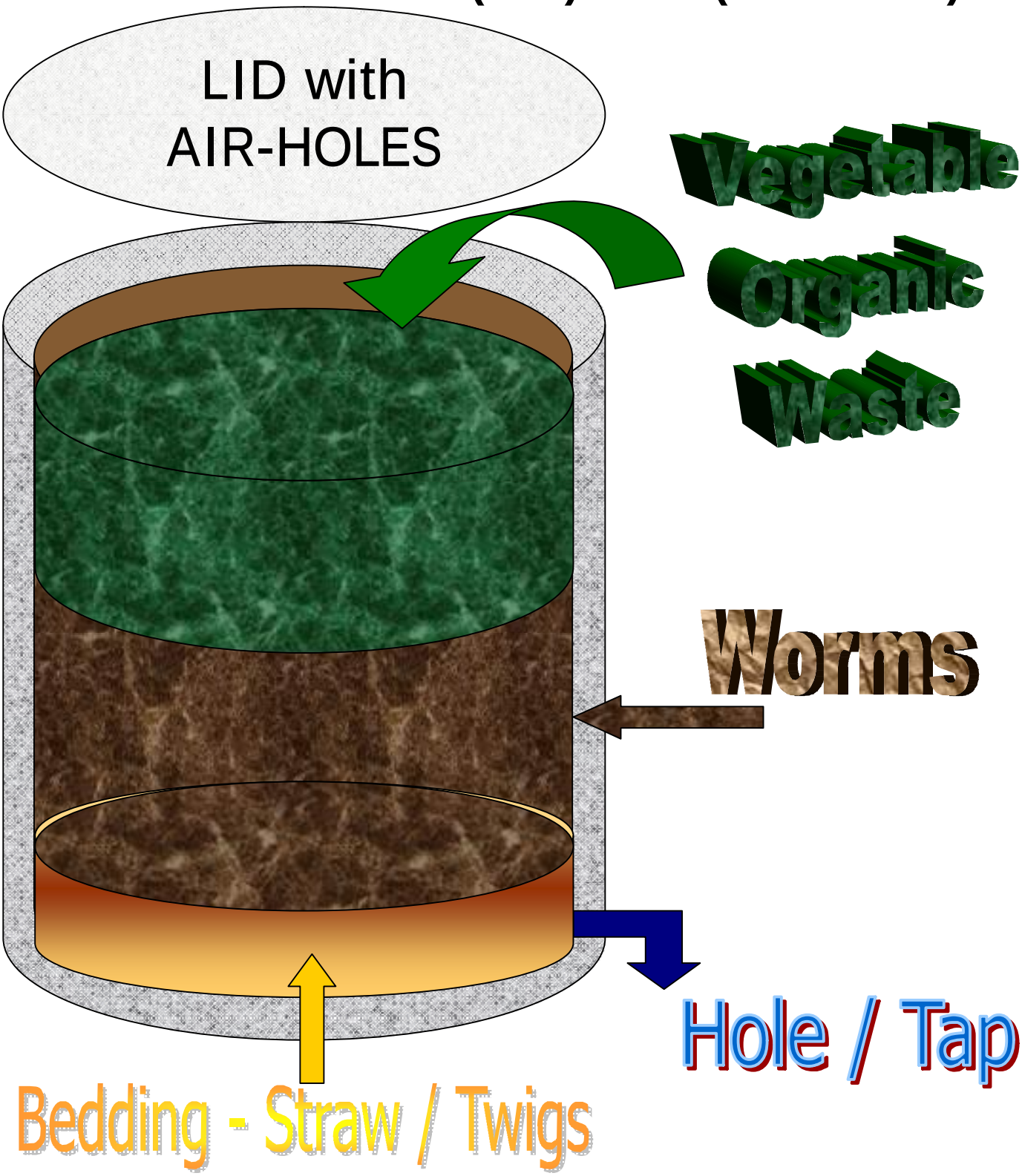
Will vacate if too Hot or Cold or Wet or Dry.

Worm Farming

WORM-BIN **Chop up tougher materials smaller**

ADD Mature Compost + Worms + Eggs

ADDITIVES – Lime (fine) / Soil (deodorises)



Collect run-off Leachate to use as liquid feed

Position: Sun in Winter / Shade in Summer

HOW TO USE COMPOST (OR COMPOSTED MANURE) AT DIFFERENT AGES AND STAGES OF MATURITY.

1. RAW COMPOST MATERIALS can be applied directly to decompose in situ where their breakdown will not overwhelm or disrupt plant-growth. A **SHEET MULCH** can be applied to the soil surface around established perennials. A **BASTARD TRENCH** can be filled with raw materials which will help retain moisture below ground and break down to feed vigorous crops like runner beans.

2. IMMATURE COMPOST, which is just 4 weeks old and has not yet finished its thermophilic breakdown, can be applied as a surface mulch to feed established annuals or added to soil for vigorous-rooting and fast-growing crops such as squash.
Raw and immature compost can cause denitrification if incorporated in the soil, where the excessive levels of carbon compete with soil micro-organisms for available nitrogen. Adding concentrated nitrogenous fertilisers can compensate. They are both more likely to introduce pests and diseases.

3. MATURE COMPOST (3-6 months old) can be incorporated in the soil 2-3 months before a crop is sown or planted out or used to mulch maturing crops. Can be mixed with soil and concentrated fertilisers into holes under individual plants, for heavy feeders such as tomatoes, peppers, aubergines and celery.

4. MATURE, HUMIFIED VERMICOMPOST, 12 months old, digested by compost worms, can be used for any of the above uses and as an ingredient in potting mixes.

To minimise the risk of introducing pests and diseases, expose maturing compost to the elements and allow vermicompost to dry in a warm and airy place. Material which has been weathered is effectively sterilised and can be used in mixes which are to be used indoors.

SITE ASSESSMENT AND DEVELOPMENT

Phase 1. Before START

Phase 2. During DEVELOPMENT

Phase 3. After COMPLETION

FACTORS

Area Shape Dimensions Cultivable Elevation Gradients Aspect
Micro-Climate Zones Niches Geography Topography Geology
Slope North-South Alignment Sun Wind Shade Shelter / Exposure
Structures Infrastructure Walls Layout Access Drainage Utilities
Existing Planting Hedges Trees Perennials Fruit Comfrey Herbs
Indicators Deficiency Wildlife Weeds

Soil(s) & Subsoil(s) Type Depth Structure Texture Fertility Residual / Inherited
Mineral Composition Humus Content Drainage Ph / Acidity Contamination
History / Previous Use / Traditions / Precedents

Risk Assessment Health & Safety Security Vandalism Psychology Dissuasion
Personal Profile Appropriate Use Proximity Visit Frequency Travel Time & Options

INTENTION Aims e.g. Outputs – season
Functions – Domestic / Community / Social (visits) / Public (events) /
Commercial = Standards – Cosmetic / Visual / Practical / Health & Safety
Future Time-scale – Annual / Medium (5 yr) / Medium (10yr) / Permanent

DEVELOPMENT PROCESS Light / shade
Schedule / Lead-times– Plan of Works / Specification / Contractors
Soil Improvement - Drainage / Structure / Organic Matter Content / Deficiencies
Decontamination – Physical / Chemical / Biological
Water – Supply / Flow / Collection Design and Build
Resources Costs / Labour Kit Technologies / Plant Material Inputs – Sourcing
Collections / Gathering E.G. Nettles Leaves Hay
Recyclables --- Woodland Stables Farms Shops
Community --- Neighbours Demography Skills

PLANNING Draw a baseline diagram to show everything which is permanent.
- Boundary / entrance / paths / structures / trees + North-south + Slope
Prioritise improvements on a realistic timescale for your time & resources

RECORDING Maintain a diary of what you plan to do, as a reminder,
and of what you've achieved, for future reference.

INTENTIONAL PROJECTS Development Strategies Potential **ß à** Actualised
Context - Socio-political / Community dynamics / Comparisons
Scope / Aims / Targets over time / Outputs / Results / Parameters

Horticultural performance generates
Social / Therapeutic / Cultural / Community / Commercial outputs

RAISED BEDS - Construction and Maintenance

1. Infrastructure

- Dig out paths following desire lines to establish an efficient network - **along contour / equal bed width.**
- Add soil to beds to increase depth of topsoil in beds - even depth / add more where thin.
- Install edging / Stake edges **on the outside**
- Path Surface exposed to elements/ Hardy Perennials (Comfrey/Balm)
- Annual Maintenance: Scraping Weeds / Clearing Paths

2. Soil Preparation

DIGGING (*Ploughing*)

- Shaving / Scraping turf / weeds Turn Clods
- Incorporate Lime – rainfall and time
- Invert and Mix Topsoil

FORKING (*Deep Tines / Chisel Ploughing*)

- Remove Weed Roots
- Introduce mature Bulky Organic Matter *(Muckspreading*)
- Incorporate / Mix Soil with B.O.M. / Additives / Fertilisers

RAKING (*Scarifying*)

- Break Clods Down into a Powdery Tilth
- Remove sticks / stones / glass to edge or off bed

3. Planting

- Seedbed Preparation Rake off Stones and Unimproved Soil
- Sowing Seed Shape Drills / Rows / Furrows Sow and Cover Seed
- Transplanting Fork soil loose and friable
  Make holes (deeper and wider than roots' immediate needs)
  Placing plant and holding vertical Spread roots radially
  Firm in stronglyLevel and shape soil round plant

4. Crop-care: Weeding and Hoeing Soil Cultivation and Sculpture
Ridging / Earthing up / Moats / Irrigation Mulching / Feeding
Watering / Liquid Feeding Spraying / Foliar Feeds

5. Harvesting Picking / Cutting / Collecting / Loading
Lifting / Pulling / Digging Out Drying / Storing
Cutting / Scything / Threshing / Baling (Combining)

TIPS:- Work from the Middle of the bed to the Edge on each side

Raking bed twice diagonally at right angles creates level surface

RAISED BEDS - Functions and Benefits

Layout **North-South Alignment + Beds along Contour**

Paths

Width for Wheelbarrow etc. Wheelchair Access / Partially-Sighted
No loss of space if crops grow over & into paths
Perennial Green Manure (Comfrey)
Slug-Trapping (Planks etc.) - Slug-Free Zone if paths kept clear

Irrigation Supply water down path network

Drainage Shed Excess Downhill Frost Drainage
Collection Space for Crop Waste

Edges Minimum gaps (slugs)

Temporary / Permanent Material - Wood / Brick / Stone etc.

Compensate **for Slope / Level Soil Surface / Increased Sun Exposure**

Terracing Edge Lowest & Deepest Side First

Higher Side Unedged / Smaller / Thinner Edge
Raised Work-surface = Less Bending / Reduced Effort

Planning / Recording

Crop Rotation Soil Preparation for Specific Crop
Separate Different Crops Isolating Pests and Diseases

Soil Increased Depth of Topsoil

Reduces Compaction Improves Structure
Improved Drainage Increased Moisture Retention
Deeper Rooting (Land Tide Soil Water Rise & Fall + Moon e.g.Dew)

No-Dig System / Contaminated Soil

Tilth for Seedbed - Rake stones into paths or to edge

Drawbacks

- Windy Sites / High Ground
  Drainage Unnecessary but other benefits apply
- High Investment in Initial Infrastructure
  Labour / Resources -- Effort Pays Back after 2nd Year

Especially good for Heavy / Clay soils
and Valley bottoms Frost-pockets Bad drainage

BED PREPARATION – New / Rough Soil

1. Clear surface / Remove weeds– Slice off with sharp spade
2. Fork over in clods – add Lime to help loosen / break down
3. Water or wait for rain / frost / wind to weather / soak
4. When drier but still moist, tread down clods to lumps
5. Add concentrated fertilisers and bulky organic matter (if required)
6. Fork and tread to break down lumps / distribute organic matter

SEEDBED PREPARATION - *Tilth*

1. Rake stones off surface – at right angle – crossways or diagonally
2. Turn whole bed with spade removing stones / roots etc.
3. Break lumps down to powder with back of spade and by treading
4. Tread bed flat, feet skating or gliding
5. Rake surface as before to clear stones and lumps
6. Rake deeply, pushing down into the soil, in line with rows

SOWING SEED DIRECT (Root Crops)

1. Establish straight lines parallel to bed edge with hoe or line
2. Flatten soil along in furrows, moving soil either side, clearing stones
3. Hoe along row deeper with angled blade to remove stones in drill
4. Shape drill within furrow, thin and shallow or wide and deep,
5. Sow seed – half all along then rest on return for equal distribution
6. Cover with fine soil drawn in from edge of furrow, at least twice as deep as the seed is long, relative to size of seed / vigour of seedling
7. Level off soil along the drill
8. Water gently with a rose twice, especially along rows or even over whole bed including ridges between rows to settle soil

TRANSPLANTING (assuming adequate soil preparation)

1. Lift seedlings with soil around their roots – moisten / water before
2. Handle root-ball or outer leaves rather than stem
3. Clear stones away from planting area, create a concave dip
4. Break up soil for hole – thrusting trowel in horizontally to vertically
5. Lift soil out of hole, distributing evenly in a circle around hole
6. Make hole twice as deep and wide as plant requires immediately
7. Place (suspend) the plant at right height in the centre of the hole
8. Bring in loose soil from outside hole in circular motion
9. Shape soil to earth up stem and form a moat around plant
10. Firm in around plant with fingers or knuckles or fists or feet
11. Water twice by filling moat and allowing water to soak in

ACTIONS ⇨ CROPS

Starting to cultivate a plot of soil.
Crop selection will be dependant on what stage of the improvement process you have achieved...

This assumes you will inherit some fertility and you complete each stage thoroughly.

1. *WEED*
Green Manures

1.a. *LOAM*
Squash

2. *FORK*
Parsnips / Peas

2.a.
Herbs

EITHER

3. *add LIME*
Onion

4. + *MULCH*
Brassicas

5. add BULKY ORGANIC MATTER
Legumes

6. *add FERTILISER*
Salads /Tomato / Aubergine /Pepper

OR

3. *add BULKY ORGANIC MATTER*
Squash

4. *add FERTILISER*
Potatoes/Corn

5. *add LIME*
Autumn Brassicas/ Alliums / Legumes

Think of this progression either for different parts of one plot
OR it could also be one piece of soil over months/years (Rotation).

GREEN MANURES

- ü Never leave the soil bare.
- ü Accumulate organic matter in situ.
- ü Legumes deposit nitrogen.
- ü Broadcast seed over any available area.
- ü Dug in before flowering.

ANNUALS 3 – 12 months

Frost tender. SUNFLOWER / PHACELIA / BUCKWHEAT
MUSTARD sown repeatedly will help clear Wireworm & Clubroot
Overwintering, frost-hardy – GRAINS / FIELD BEANS

BIENNIALS 9 – 18 months

Clean seedbed for CLOVER / ALFALFA, deep-rooting N-fixers.
Grazing RYE sown in August produces a luscious mat of thick vegetation, a duvet for raised beds.

PERENNIALS 3 years +

COMFREY (*Boneset / Knitbone)* recycles Potash
LUPINS – Fix Nitrogen and look lovely.

TIPS:

EDIBLE Green Manures

Sow salad greens or spinach thickly and cut and come again.

INTERCROP

Sow fast growing GM to fill gap between slower plants or rows.

"TAMING" NEW SOIL

Tired and neglected soils need bulky organic matter input.
Use Green Manures to help mix and consolidate before the crop.

PLANTS ARE AMAZING!

- ü **NATIONAL** Identity and Branding / Cultural significance /
  (e.g. *Irish - Potato - Pocheen / Famine! Or Japan - Rice / Sake etc.)*
  Sense of Place / Belonging – Terr-oire / Territory / Tradition
- ü **PHYSIOGMONY** (Racial Traits) – Indigenous / Authentic
- ü **MULTICULTURAL** Fusion and Hybridisation

- ü Edible crops are the basis of **AGRICULTURE**
- ü Plant Products are the foundation of **INDUSTRIES**
- ü **BIOSYNTHESIS** central to Drug manufacture / Chemical factories
- ü Psychotropic plants cited as the origin of **RELIGIONS**
  Idiocy of ***War*** on Plants! (Competition for food / water)

- ü **SOIL-BUILDING /REPAIR** (Post-industrial Landscape Urban or Rural)
- ü **GEOLOGY** – Oil / Coal / Gas / Peat = **ENERGY** (fossil / non-renewable)
- ü On a Geological **TIMESCALE**, plants balance atmospheric O_2 / CO_2
- ü Definition of **RENEWABLE** – more meaningful than "*sustainable* "

- ü **TREE** = Solar Collector / Pump / Air Purifier / "*Carbon Capture*"
- ü Tree-rings (**Dendrochronology**) Record weather and environment
- ü **ITERATION** -> Complexity / Fractals / Holographic / Double Helix
- ü **PHYLOTAXY** The Fibonacci Sequence (1/2/3/5/8/13/21/34 etc.)
- ü **FEEDBACK** mechanisms create the impression of plant intelligence
  e.g. Conversion rate of Blossom into Fruit (Frost / Water / Nutrients)

- ü Plants are **DNA** Reproduction Mechanisms (*Chelsea* = *Sex Machines*!)
- ü **MOBILITY** Strategies to Colonise & Adapt to stable 'Climax' vegetation
  So all plants are Triffids (over time/ aeons) e.g. Dandelion / Yew / Birch
- ü **PANSPERMIA** Fungal Spores survive space travel (*Aliens*!)
- ü **SYMBIOSIS** – *Rhizosphere* Micro-Organisms / Canopy Oak 170 co-exist
- ü **MYCORHIZAL ASSOCIATION** e.g. Birch tree + Flyagaric mushroom
- ü **CO-EVOLUTION** Flower + Insect together /specialised (Humming bird)

- ü Genetic **HERITAGE** of Diversity. Natural Mutations / Sports / Mutagens
- ü **QUANTUM** Science – Photosynthesis exploits dual states of light.
  Enters as a ***Wave*** and ***Particle*** to split Water into Hydrogen and Oxygen

Practically Infinite **VARIETY** allows you a Personal Repertoire / Familiars

ARCHETYPE Generic / Quintessential idea e.g. "Cabbage"
UR-PLANT = Totality of impressions e.g. combined "Brassica"

CROP TERMS / CATEGORIES / CLASSIFICATIONS

1. **BOTANICAL** Monocotyledons / Di-cotyledons (seed & true leaves)
Families / Species / Varieties / Cultivars (Latin Nomenclature)

2. CROPPING SEASON
Early / Main / Late Spring / Summer / Autumn / Winter

3. LIFESPAN OF CROP Evergreen / Deciduous
Annual (half-hardy /frost-tender) Biennial (tri-) Perennial (short-lived)

4. FERTILITY REQUIREMENTS Heavy-/Light-feeders / Nitrogen-fixers
Nitrogen (N / Leaf) / Potassium (K / Roots) / Phosphorous (P / Fruit)
Acid-lovers (Calcifuges) / Lime-lovers (Calciphiles)

5. APPROPRIATE SOIL TYPE
Loam / Humus / Sand / Silt / Clay / Peat / Chalk / Alpine / Meadow

6. CROP TYPE Seed / Shoot / Leaf / Stem / Bud / Flower / Fruit / Root
Fruits / Herbs / Vegetables – Greens / Salads / Cut and Come again

7. ORIGINS Native / Wild / Indigenous / Introduced / Exotic
Tropical / Continental / Arctic / Mountain / Lowland / Maritime / Coastal

8. GROWTH HABIT
Tall / Giant / Dominant / Architectural OR Short / Dwarf / Compact
Climbing / Spreading / Trailing / Creeping
Determinate (Bush) / Indeterminate (Vine)
Deep-rooting / Tap-root / Surface-rooting / Fibrous-rooting

9. GROWTH REQUIREMENTS
Sun-loving / Drought-tolerant / Shade-tolerant / Moisture-loving
Outdoor / Unheated / Hot-house / Conservatory / Protected / Exotic

10. SEED Land-race / Cultivar / Hybrid / Terminator

11. USE Ripeness / Freshness / “Local” / Processing
Culinary / Dessert / Medicinal / Fodder -crop

12. QUALITY Grade A,B,C / 1,2,3 Table / Exhibition / Competition

13. SYMBOLS Organic / Biologique / Okologishe / Biodynamic / Demeter

14. SCALE OF PRODUCTION Intensive (Small-) / Extensive (broad-)
Home-Grown / Garden / Allotment / Kitchen Garden / Market Garden Field / Farm / Greengrocer / Supermarket / Mass-market

EDIBLE CROPS - Botanical Families

Genus + Species + Variety

MONOCOTYLEDONS = Single seed leaf

GRAMINAE / POACEAE (Grains)

Corn	Wheat	Rice	Barley	Oats	Millet	Rye

AMARYLLIDACEAE /LILIACEAE (Bulbs)

Garlic	Allium sativum
Onion	Allium cepa
Leek	Allium ameloprasum var. porrum
Chives	Allium schoenoprasum
Shallots (Scallions)	
Asparagus	Asparagus officinalis

DICOTYLEDONS = 2 seed leaves

BRASSICACEAE / CRUCIFERAE (Cross-shaped petals)

White Mustard	Brassica hirta
Brown Mustard	Brassica nigra
Chinese Mustard	Brassica juncea
Turnip	Brassica rapa
Chinese Cabbage	Brassica rapa spp. Chinensis
Swede	Brassica napus
Cabbage	Brassica oleracea var. capitata
Sprouts	Brassica oleracea var. gemmifera
Kale	Brassica oleracea var. acephala
Cauliflower	Brassica oleracea var. botrytis
Broccoli	Brassica oleracea var. Italica
Kohl Rabi	Brassica oleracea var. gongyloides
Radish	Raphanus sativus
Rocket	Eruca sativa
Watercress	Nasturtium officinalis

LEGUMINOSAE (Fix Nitrogen)

Pea	Pisum sativum
Broad Bean	Vicia fava
French Bean	Phaseolus vulgaris
Runnner Bean	Phaseolus coccineus
Lentil / Soy / Pea-Bean / Lima / Cow Pea / Yardlong	

POLYGONACEAE (Seed shape)

Rhubarb	Rumex rhubarbarum
Sorrel	Rumex acetosa
	Fagopyron

ASTERACEAE / COMPOSITAE (Daisy)

Marigold	Calendula officinalis
Sunflower	Helianthus annuus
Root Artichoke	Helianthus tuberosus
Globe Artichoke	Cynara scolymus
Cardoon	Cynara cardunculus
Lettuce	Lactuca sativa
Endive	Chicorium endivia
Chicory	Chicorium intybus
Chopsuey / Shungiku	Chrysanthemum coronarium
Salsify	Tragopogon porrifolius
Scorzonera	Scorzonera hispanica
Lawn Chamomile	Chamaemelum nobile
Wild Chamomile	Matricaria recutita

LABIATAE (Lip shape flower)

Mint	Mentha species
Nettle	Urtica dioica
Lemon Balm	Melissa officinalis
Oregano	Origanum vulgaris
Marjoram	Origanum marjorana
Basil	Ocymum basilicum
Rosemary	Rosmarinus officinalis
Sage	Salvia officinalis
Thyme	Thymus vulgaris
Savory	Satureja hortensis

UMBELLIFERAE / APIACEAE Bees/flies

Carrot	Daucus carota var.sativus
Parsnip	Pastinaca sativa
Celery	Apium graveolens var. dulce
Celeriac	Apium graveolens var. rapaceum
Fennel	Foeniculum vulgare var. azoricus
Parsley	Petroselinum crispum
Coriander	Coriandrum sativum

CHENOPODACEAE (Seed cluster)

Beetroot	Beta vulgaris
also Chard/Perpetual/Spinach Beet/Sugar Beet	
Spinach	Spinacea oleracea
Quinoa	Chenopodium quinoa

SOLANACEAE (Nightshades)

Potato	Solanum tuberosum
Aubergine	Solanum melongea / macrocarpon / aethiopicum
Tomato	Lycopersicon lycopersicon
Cherry Tomato	Lycopersicon pimpinelifolium
Tomatillo	Physalis edulis
Cape Gooseberry	Physalis peruviana
Sweet Pepper	Capsicum annuum
Chilli Pepper	Capsicum frutescens / pubescens / baccatum

CUCURBITACEAE (Gourds)

Courgette / Marrow	Cucurbita pepo
Winter Squash	Cucurbita maxima
Butternut Squash	Cucurbita moschata
Japanese Pumpkin	Cucurbita mixta
Cucumber	Cucumis sativus
Melon	Cucumis melo
Watermelon	Citrullus lanatus

ROSACEAE (5 Petals + Fruit)

Apple	Malus domestica
Pear	Pyrus communis var. culta
Plum	Prunus domestica
Cherry	Prunus species
Almond / Peach / Nectarine / Apricot	Prunus dulcis
Strawberry	Fragaria vesca

CANNABACEAE (Resins)

Hops	Humulus lupulus
Hemp	Cannabis sativa / indica / ruderalis

BORAGE – Comfrey – Bocking crosses

Grape – *Vitis vinifera*
Banana – *Musa spp*. x 300
Citrus – infinite crosses

VEGETABLE TABLE

VEGETABLE	Seeds or roots per 50ft. row	How long Seed keeps	When to Sow	When to Plant	Depth to Sow or Plant	How far apart	Between rows	Thin to	Weeks till eating	Ready for eating	When to Harvest	Good Crop for 50 foot row As picked or dug
Bean Broad, Longpod	½ pint	2 years	November		3in.	4-6in.	2-2½ft.		24	June		40lb.
Bean Broad, Windsor			Feb—April		3in.		3ft.		20	June—July		40lb.
Bean French	½ pint	2 years	May—July		2in.	6in.	3ft		14	July—Oct.		75lb.
Bean Runner	½ pint	2 years	May—June		2in.	9in.	30in. prs.		14	July—Oct.		85lb.
Bean Tic, for Drying	2oz.	2 years	November		2in.	1ft.	1ft.			Aug.—July	Aug.—Sept.	4lb.
Beet	1oz.	5 years	April—June		1in.		8in.	6in.	16		October	75lb.
Beet Spinach	½oz.	5 years	March—April		1in.		18in.	1ft.	24	Sept.—Dec.		85lb.
Broccoli Heading	¼oz.	5 years	April—May	May—July	½in.	18in.	18in.		18-30	Oct.—May		30 heads
Broccoli Sprouting	¼oz.	5 years	March—May	May—July	½in.	2ft.	30in.			Dec.—May		35lb.
Brussels Sprouts	¼oz.	5 years	March—April	May—July	½in.	20in.	30in.		18-24	Oct.—March		36lb.
Cabbage, Green or Red	¼oz.	5 years	March—June—Aug	May—June	½in.	1-2ft.	1-2ft.		18-24	All Year		30 heads (75lb
Carrot	½oz.	3-5 years	March—June		1in.		8-12in.	6-8in.	16-24	June—Mar.	October	75lb.
Cauliflower	¼oz.	5 years	April	May—June	½in.	2ft.	2ft.		16-24	Aug.—Nov.		30 heads (50lb.)
Cucumber (Burpless)	20 seeds	7 years	April		½in.	2ft.	2ft.		14	Aug—Oct.		80 (60lb.)
Kale, Curly	½oz.	4 years	April		1in.	30in.	3ft.		18	Nov.—April		70-80lb.
Kale, Rape	¼oz.	5 years	April—May	July	½in.	2ft.	30in.		18	Nov.—April		70-80 b.
Kholrabi	½oz.	4 years	July		1in.		1ft.	1ft.	14	July—Nov.		50lb.
Leek	¼oz.	3 years	Feb—April	May—Aug.	1in.	8in.	1ft.		16	Sept.—April		75 leeks (40lb.)
Lettuce	¼oz.	4 years	March—Sept.		½in.		1ft.	8in.	10	All Year		75 lettuces (75lb.
Marrows	14 seeds	6 years	April—May		1in.	3ft.	4ft.		14	July—Oct.		40-60 fruit
Onion Sets	100 bulbs (½lb)			March	2in.	6in.	1ft.		24	All Year	August	45lb.
Onion Seed	¼oz.	4 years	March or Aug.		1in.		8in.	6in.	24	All Year	August	60-60lb.
Parsley	1oz.	2 years	Feb or July		1½in		1ft.	6in.	14			All you want
Parsnip	½oz.	1 year	Feb—April		1in.	3in.	1ft.	1ft.	26	Winter	November	50lb.
Peas	1 pint	2 years	Jan—July		3in.	1ft.	2-4ft.		14	June—Sept.		30lb.
Potatoes, Early	7lb.			March—April	6in.	15in.	18in.		12	July	August	60lb.
Potatoes, Maincrop	7lb.			March—April	6in.	15in.	27in.		25		October	100lb.
Radish	½oz.	4 years	Feb—Aug.		½in.		8in.		5-6	April—Oct		40 bunches
Salsify	½oz.	2 years	April		1in.	1ft.	12in.	8in.	18	Nov.—March	Leave in	20-30lb.
Savoy	¼oz.	5 years	March—April	May—June	½in.	12-18in.	2ft.		18	Oct.—Feb.		40-50
Shallot	2lb.		Feb—March		2in.	8in.	1ft.		24	Winter	June	30-40lb.
Spinach, Summer	1oz.	2 years	Feb—Aug.		1in.		1ft.	9in.	8	May—Sept.		35lb.
Spinach, Winter	1oz.	2 years	August		1in.		1ft.	6in.	10	Oct.—March		35lb.
Spinach, New Zealand	1oz.	2 years	March		1in.		2ft.	1ft.	14	June—Oct.		30-40lb.
Swedes	½oz.	2 years	May—July		1in.		1ft.	1ft.	20	July—March	November	40-60lb.
Tomatoes, Outdoor	¼oz.	3 years	April	May—June		2ft.	3ft.		14	Aug.—Oct.	October	av. yr. 80lb.
Turnips	½oz.	2 years	Feb—June		1in.		1ft.	6in.	6	May—March	As required	50lb.

WHAT YOU COULD BE EATING IF YOU HAD SOWN IN TIME

JANUARY	SOWN	PLANTED
Beet (Stored)	May	August
Broccoli (Heading)	April	July
Brussels Sprouts	May	June
Cabbage	June	
Carrots (Stored)	April	
Kale	April	June
Leeks	April	July
Onions (Stored)	March	
Parsnips (Stored)	April	
Potatoes (Stored)		April
Salsify	April	
Savoys	April	June
Shallots (Stored)		March
Spinach, Winter	Sept	
Swedes (Stored)	July	
Tomatoes (Bottled)		May
Turnips (Stored)	June	

FEBRUARY	SOWN	PLANTED
Beet (Stored)	May	
Broccoli, Early Sprouting	April	July
Brussels Sprouts	April	June
Cabbage	June	August
Carrots (Stored)	April	
Kale	April	June
Leeks	April	July
Onions (Stored)		March
Parsnips (Stored)	April	
Potatoes (Stored)		April
Spinach, Winter	Sept.	
Salsify	April	
Swedes (Stored)	July	
Tomatoes (Bottled)		May
Turnips (Stored)	June	

MARCH	SOWN	PLANTED
Beet (Stored)	May	
Broccoli, Sprouting	April	June
Brussels Sprouts	April	June
Cabbage	June	Sept.
Kale	June	Sept.
Parsnips (Stored)	April	
Potatoes (Stored)		April
Salsify Leaves	April	
Tomatoes (Bottled)		May
Turnips (Stored)	June	

APRIL	SOWN	PLANTED
Beet (Stored)	May	
Broccoli, Late	May	July
Cabbage	June	Oct.
Leeks	April	August
Onions, Spring	August	
Onions (Stored)		March
Potatoes (Stored)		April
Salsify Leaves	April	
Spinach, Summer	Feb.	

MAY	SOWN	PLANTED
Beet (Stored)	May	
Broccoli, Late	April	July
Cabbage	June	Oct.
Lettuce		March
Onions, Spring	August	
Onions (Stored)	March	
Radishes	March	
Spinach, Summer	Feb.	
Tomatoes (Bottled)		May

JUNE	SOWN	PLANTED
Beans, Broad	Nov.	
Carrots, Early	March	
Cauliflowers		March
Cabbage		March
Lettuce	March	
Onions, Spring		March
Potatoes, Early		March
Peas, Early	March	
Radishes	April	
Spinach	April	
Tomatoes (Bottled)		May
Turnips	Feb.	

JULY	SOWN	PLANTED
Beans, Broad	Nov.	
Beet, Fresh	March	
Carrots, Early	March	
Cauliflowers		April
Khol-rabi	April	
Lettuce	April	
Onions, Spring		March
Peas, Early	April	
Potatoes, Early		March
Radishes	May	
Spinach	May	
Swedes	April	
Tomatoes (Bottled)		May
Turnips	March	

AUGUST	SOWN	PLANTED
Beans, Windsor	March	
Beans, French	May	
Beans, Runner	May	
Beet, Fresh	April	
Cabbage	March	May
Carrots, Short	April	
Cauliflowers	April	June
Cucumbers	April	
Khol-rabi	May	
Lettuce	April	
Marrows/Courgettes	April	
Onions		March
Peas, Maincrop	April	
Potatoes, Early		April
Radishes	June	
Spinach	June	
Spinach N.Z.	March	
Tomatoes, Outdoor		May
Turnips	May	

SEPTEMBER	SOWN	PLANTED
Beans, French	May	
Beans, Runner	May	
Beans, Windsor	March	
Cabbage	March	May
Carrots, Maincrop	April	
Cauliflowers	April	May
Cucumbers	April	
Khol-rabi	June	
Lettuce	July	
Marrows Courgette		April
Onions		March
Peas, Maincrop	May	
Potatoes, Early		March
Radishes	July	
Spinach	July	
Spinach, N.Z.	March	
Tomatoes, Outdoor		May
Turnips	June	

OCTOBER	SOWN	PLANTED
Beans, French	May	
Beans, Runner	May	
Beet	June	
Broccoli	March	May
Brussels Sprouts	April	June
Cabbage	April	June
Cauliflowers	April	May
Leeks	April	June
Lettuce	August	
Onions	March	
Parsnips	April	

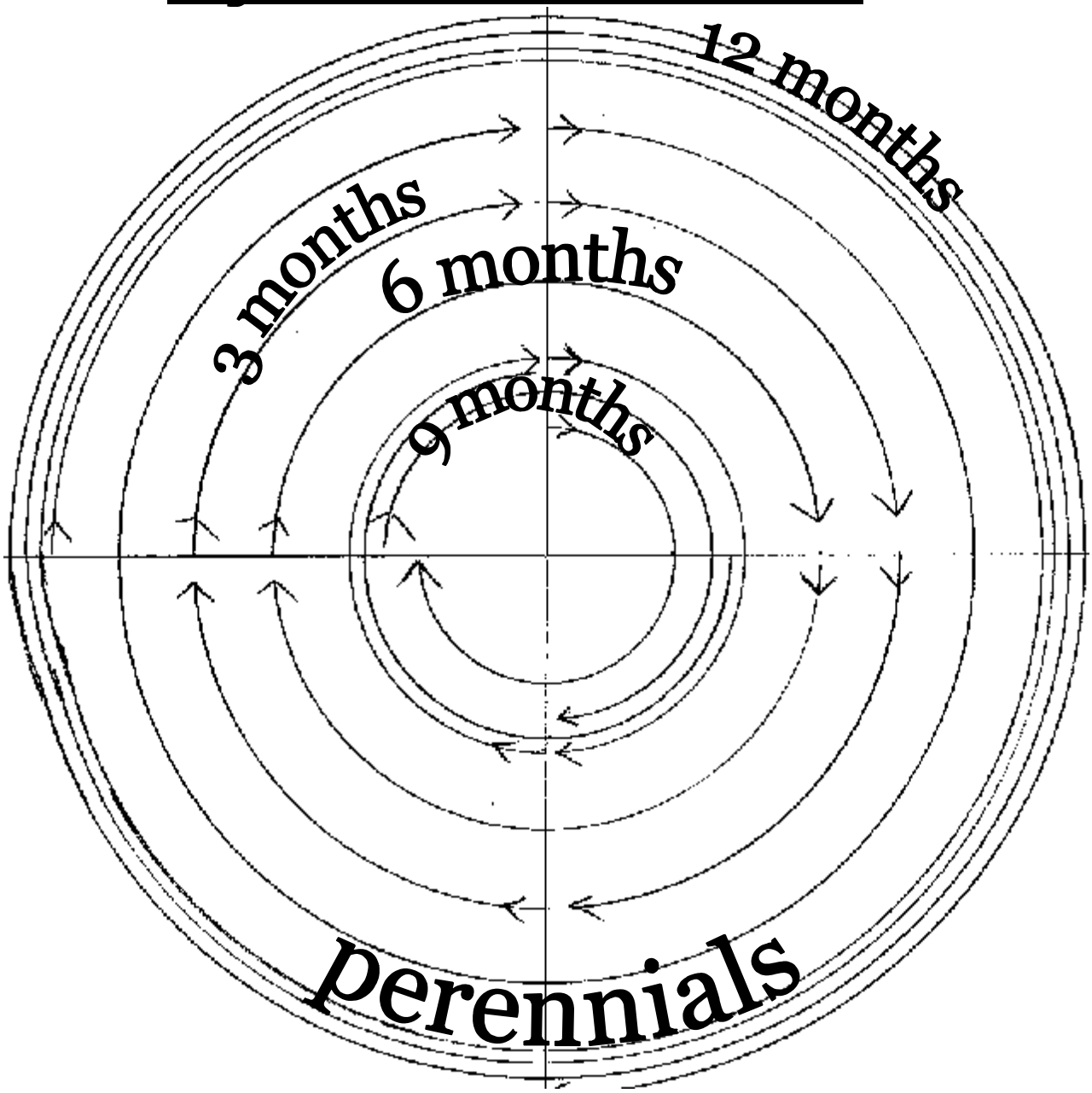
NOVEMBER	SOWN	PLANTED
Beet	May	
Broccoli	April	June
Brussels Sprouts	April	June
Cabbage	April	June
Carrots	April	
Leeks	April	July
Onions	March	
Parsnips	April	
Potatoes	June	April
Salsify	April	
Savoys	April	July
Shallots		Feb.
Spinach	August	
Tomatoes (Bottled)		May
Turnips	July	

DECEMBER	SOWN	PLANTED
Beet (Stored)	May	
Broccoli	April	June
Brussels Sprouts	April	June
Cabbage	April	July
Carrots	April	
Kale	April	June
Leeks	April	July
Onions		March
Parsnips	April	
Potatoes		April
Salsify	April	
Savoys	April	July
Shallots		Feb.
Swedes	June	
Tomatoes (Bottled)		May
Turnips	July	

NOTES FOR THESE LISTS

This is written for beginners and to remind experienced gardeners who can easily forget and have a gap. It assumes you have no frame or greenhouse, so where there is a planting time but no sowing one it means you should have bought plants. Times are approximate, you may be able to sneak things earlier or later in the South.

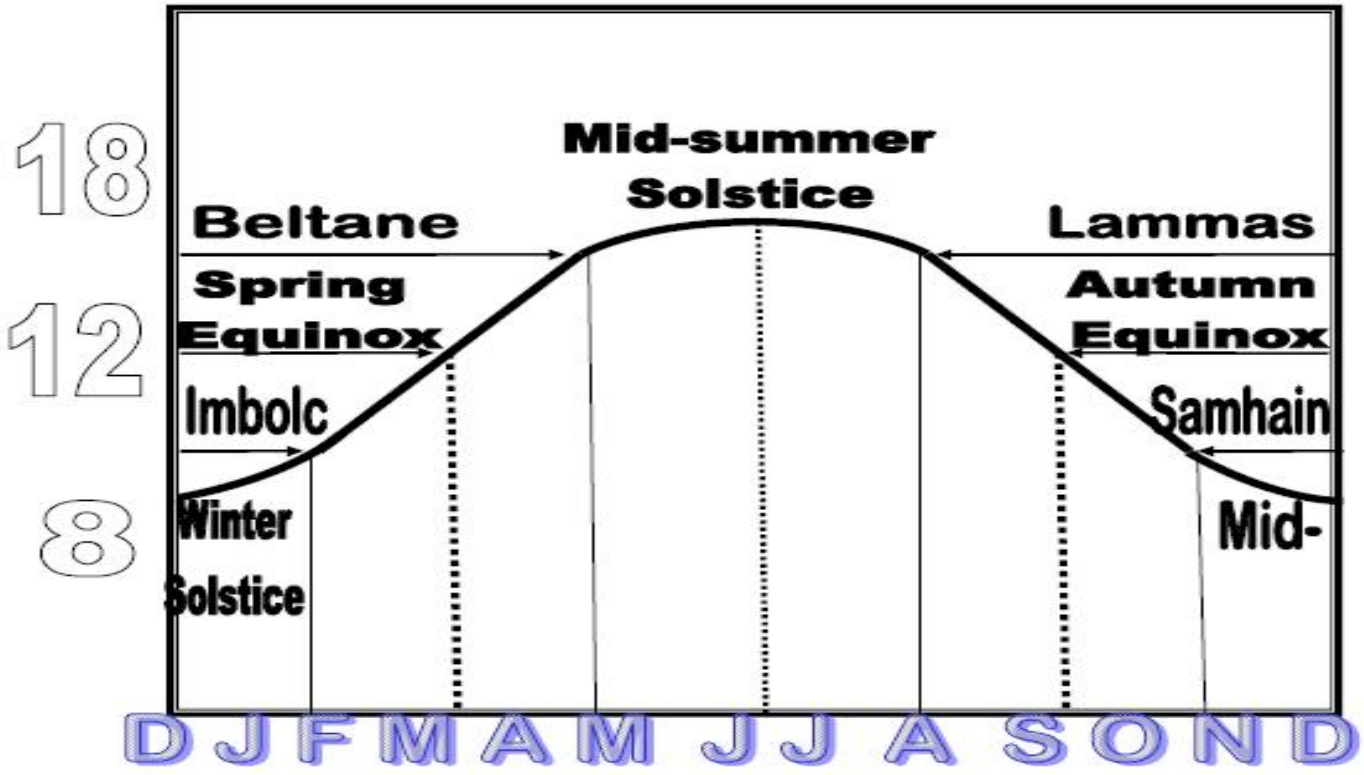
Cycle of the Year



Think of the Growing Year as a series of interlinking
and over-lapping cycles from now into the future.
Depending how long they take to mature,
you can start to generate a continuous stream of crops,
throughout the calendar year
and from year to year into the future.

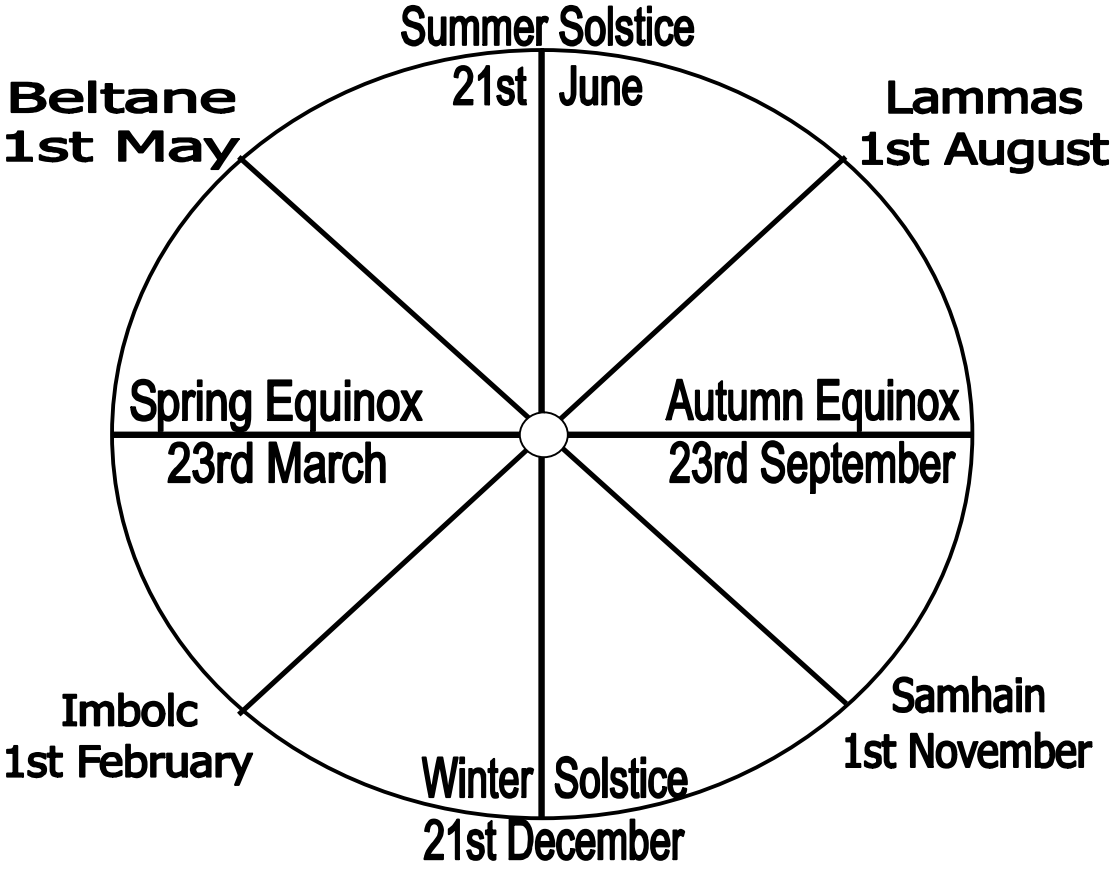
Your future self will thank your past self
for sending gifts through time!

DAY-LENGTH



Pagan Fire Festivals, **six weeks** after Solstices and Equinoxes, timed to coincide with the soil's delayed response to the sun.

The Growing Year



NEW MOON

Sow Seeds

AXING

Feed Water

FULL MOON

Rest

Crop Harvest

WANING

Cuttings

Transplant

DARK MOON

^ High v Low m Near £ Far

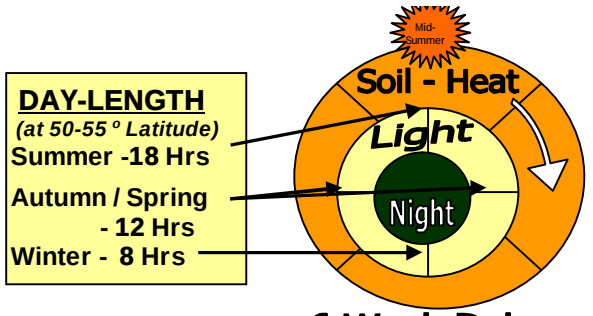
	24 h {	23 i	23 ^	£ 22	21 ` {	^ High	v Low	m Near		£ Far	m 14	v 14 g
	25 i	24 ^	24 _	23 ` {	^22 ` {	20 a	20 b	18 c	17 d {	16 e	15 f	15 h {
	26 i	25 ^	25 _	24 ` {	23 a	21 a	21 c	19 c	18 e	m 17	v16 g	16 h {
	27 ^	26 _	£ 26	25 ` {	24 a	22 b	22 c	20 d {	m 19	18 f	17 g	17 h {
	28 ^	27 _	27 ` {	^26 a	25 b	23 b	23 d {	21 d {	20 f	v19 f	18 h {	18 i
Jan	29 ^	£ 28	28 ` {	27 a	26 b	24 c	24 d {	22 e	21 f	20 g	19 h {	19 i
1st ^	30 _	29 ` {	^29 ` {	28 b	27 b	25 c	25 d {	m 23	v22 g	21 g	20 i	20 ^
2 _	£ 31	1 Mar {	30 a	29 b	28 c	26 d {	26 e	24 f	23 g	22 h {	21 i	21 ^
£ 3	1 Feb {	^2 a	31 a	30 b	29 c	27 d {	27 e	25 f	24 g	23 h {	22 i	22 _
4 _	2 ` {	3 a	1 Apr	1 May	30 d {	28 e	28 f	v26 g	25 h {	24 i	23 ^	23 _
5 ` {	^ 3 ` {	4 a	2 b	2 c	31 d {	29 e	m 29	27 g	26 h {	25 i	24 ^	24 _
6 ` {	4 a	5 b	3 c	3 d {	1 Jun	30 f	v 30 g	28 h {	27 i	26 ^	25 _	£ 25 ` {
^7 a	5 a	6 b	4 c	4 d {	2 e	m1Jul	31 g	29 h {	28 i	27 ^	26 _	26 ` {
8 a	6 b	7 c	5 d {	5 e	m 3 f	v 2 g	1 Aug {	30 i	29 ^	28 ^	27 _	^27 a
9 a 07.30	7 b 21.54	8 c 09.40	6 d { 20.19	m 6 e 04.35	4 f 12.12	3 g 19.52	2 h { 04.28	31 14.58	30 ^ 04.19	29 _ 19.50	£ 28 { 14.46	28 a 10.21
10 b	8 c	9 d {	m 7 e	7 f	v 5 g	4 g	3 i	1 Sep	1 Oct	30 _	29 ` {	29 a
11 b	9 c	10 d {	8 e	8 f	6 g	5 h {	4 i	2 ^	2 _	£ 31 {	^30 a	30 b
12 c	10 d {	m 11	9 f	v 9 g	7 h {	6 h {	5 ^	3 ^	3 _	1 Nov {	1 Dec	31 b
13 c	11 d {	12 e	10 f	10 g	8 h {	7 i	6 ^	4 _	4 ` {	^2 ` {	2 a	
14 d {	12 e	13 f	v 11 g	11 h {	9 i	8 i	7 ^	5 _	£ 5 ` {	3 a	3 b	
15 d {	m 13	14 f	12 g	12 h {	10 i	9 ^	8 _	6 _	^6 ` {	4 a	4 b	
16 e	14 e	v15 g	13 h {	13 i	11 i	10 ^	9 _	£ 7 ` {	7 a	5 b	5 c	
17 e	15 f	16 g	14 h {	14 i	12 ^	11 ^	£ 10 {	8 ` {	8 a	6 b	6 c	
m 18	v16 f	17 h {	15 h {	15 ^	13 ^	12 _	11 ` {	^9 a	9 b	7 b	7 d {	
19 f	17 g	18 h {	16 i	16 ^	14 _	£ 13	12 ` {	10 a	10 b	8 c	8 d {	
v 20 g	18 g	19 h {	17 i	17 ^	£ 15	14 ` {	^13 a	11 a	11 c	9 c	9 e	
21 g	19 h {	20 i	18 ^	18 _	16 _	15 ` {	14 a	12 b	12 c	10 d {	10 e	
22 g	20 h {	21 i	19 ^	£ 19	17 ` {	^16 ` {	15 b	13 b	13 c	11 d {	11 f	
23 h { 07.39	21 i	22 ^ 14.37	20 ^	20 _ 00.47	18 ` {	17 a	16 b	14 c	14 d {	12 e	12 f	
Sundays Underlined	22 i 22.35		21 _ 08.19		^19 a 16.02	18 a	17 b 16.55	15 c	15 d { 13.03	13 e 22.08	m13 08.42	
						19 b 05.24		16 d { 03.11				

2013

h	Aquarius
i	Pisces
^	Aries
_	Taurus
`	Gemini
a	Cancer
b	Leo
c	Virgo
d	Libra
e	Scorpio
f	Sagittarius
g	Capricorn

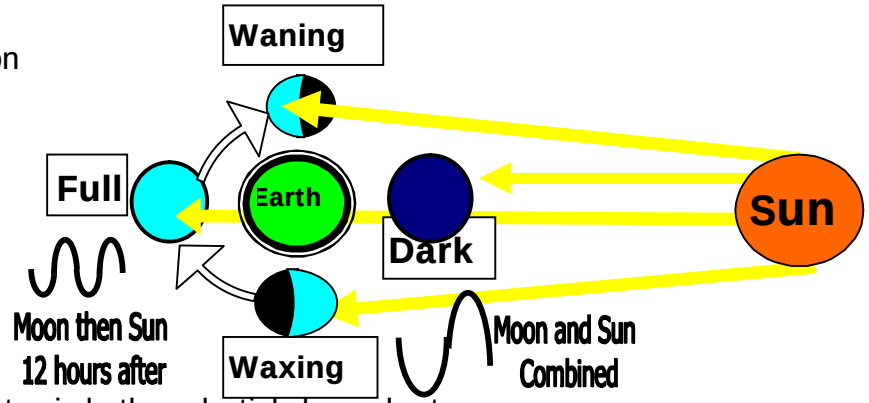
EDICULTURE LUNAR GROWING CALENDAR 2012

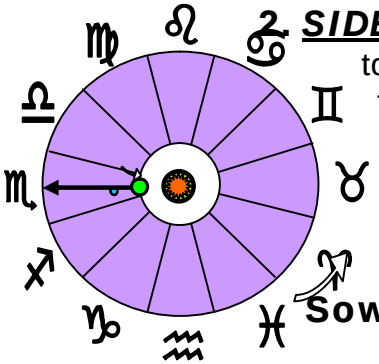
SUN and SEASON The influence of the Sun and the Weather are the most important factors affecting conditions for both plants and grower. Solar activity dictates availability of necessities such as **heat, light** and drives **weather** systems.
Weather can be **6 weeks ahead OR behind** what would be typical at that time of year.
The **Growing season** is **6 weeks behind** the calendar date, which is how long it takes for light (Day-length) to warm or cool the soil and hence affect plants.



1. *SYNODIC* MONTH (*PHASES*) The visible Moon takes **29½** days to complete the cycle through its Phases from New to Full and back to New. *The gravitational effect of the **Moon** is equal to that of the **Sun**.*
Just as the Moon produces high and low tides in the oceans (macro-scale), water also rises and falls within the soil and plants (micro-). When sun and moon are in conjunction [**Dark**], they produce one combined pull and push every day, helping roots to search for water. When the Sun and Moon are opposite [**Full**], water is pulled up and pushed down twice a day, twelve hours apart, encouraging vigorous growth.

Sow seeds as many days **before** Full Moon as they take to germinate. Harvest mature crops **after** Full Moon, when growth cycle is complete. They will store better and for longer. Take cuttings and transplant when the moon is **Waning**, before Dark Moon, to enhance rooting.





2. *SIDERIC* MONTH (*POSITION*) The Moon takes **27⅓** days to circle the celestial sky and return to its starting point. The sky can be understood to be a **Zodiac** made up of 12 constellations, each 30° of the 360° of a complete circuit. This system takes account of human psychology as well as plants' needs.
It takes the Moon 2-3 days to pass through each section, giving 3 opportunities to work with each of the 4 crop types each month. The Moon affects plants differently according to which Sign it is passing through, promoting and enhancing a specific **Growth Process**: - **Flower Leaf Fruit / Seed Root**
The 12 Signs correspond to the four **Elements:-** ***Air Water Fire Earth***
Sow and work with on the day for type of Crop:- {

3. *ANOMALISTIC* MONTH - Moon's ***Proximity*** to (**m near**) or ***Distance*** from (**£ far**) Earth.
The Moon's disc is larger when closest (***Perigee* m**) and smaller when furthest away (***Apogee* £**).
Its gravitational effect is proportionately stronger or weaker. This cycle is just over **27⅓** days long. The Moon is **40,000 Km / 16,000 miles** closer at perigee than at apogee. Sow seed before Perigee, seed sown at Apogee will be more likely to bolt.

4. *TROPICAL* MONTH – ***Elevation*** = highest in the sky (**^ high**) and ***Declination*** = lowest point (**V low**).
Days when Moon ***ascending*** suitable for grafting. When ***descending*** for sowing roots, transplanting, pruning.

POLYTUNNELS

Artificial environments depend on management to mediate extremes
Aim to maximise use of volume / hot-crop yield + out of season
2nd crop - Overwintering /cool-loving /short-day tolerant /early /late
e.g. Leafy / Oriental greens (sow July-Aug / crop October – March)

Before and After

VENTILATION

HEAT + LIGHT + TRANSPIRATION / EVAPORATION RATES
1.COOL / CLOUDY / WINDY / UP TO 20°c Warm days Oct – Mar...
Open windows for 30-60 minutes twice daily to change air.
2. HOT / SUNNY / CALM / 20°C+ / Direct, full, overhead sunlight
Open windows / doors fully by 10 a.m., adjusted to catch breeze
3. TEMPERATURE INSIDE + SHADE – 25-35°C Open all day / night
N.B. 40°C and above dangerous for plants and people

WATERING

Avoid over-watering

Daily on hot / sunny days esp. if there is a dry wind (Summer)
Every other day if weather warm / sunny spells (Spring / Autumn)
Once a week if cool / dull / rainy / overcast continuously (Winter)

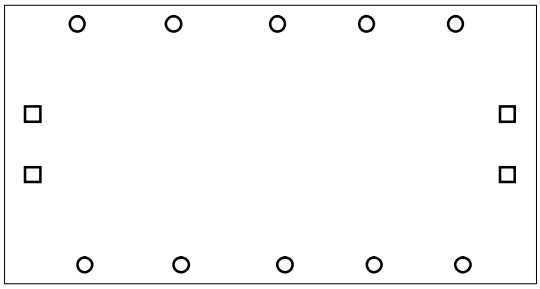
HOW TO WATER

By hand / gravity / cans / buckets - Faster than hose!
Use ambient / warm water from butts. Not cold from tap
Water thoroughly / twice to moisten then soak in
Water in a circle around plants (drip line / soil-sculpture)
RE-FILL BUTTS AFTER WATERING

Polytunnel Construction

- ü Do Soil Preparation **BEFORE** covering
- ü Maximise **VOLUME** – Area + Height

Anchors + Post-holes

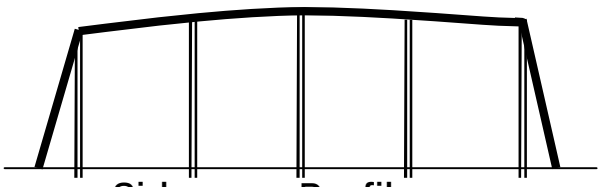


TRENCHING – 12 x 12 inch
Smooth / Uniform along length

ANCHORS – Place first pair, connect 1st hoop & ridge-pole. Place second pair at correct length and adjust width + height

Pin at lower point to lift later, on a hot day, to maximise tension

Frame SHAPE

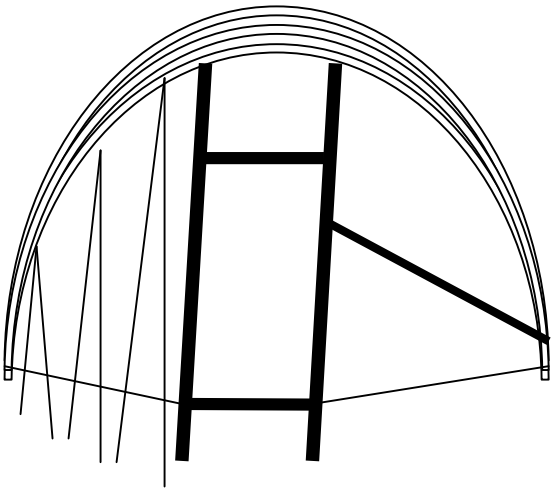


Sideways Profile

ARC along length allows contact between plastic and hoops Door Frames – Angled towards ends creates strong **A-frame** which buffers and strengthens end-to-end.

COVER - Preferably thermal, anti-fogging, heavy gauge
ANTI-HOTSPOT TAPE – Foam insulates plastic from heat of metal poles

End Profile



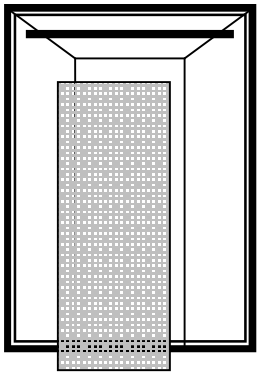
STRUTS to join – Door-frame to 1st hoop
1st hoop to 2nd hoop near ground level

DOORS – O.D. 1-2mm smaller than Frame I.D.
Cover with excess cut off to make doorways
Double layer of plastic if possible
Handles / Locks / Opening Adjusters

Cutting Plastic – to corners of doorframe
Flap parallel to top of frame to wrap round baton
Sharp Stanley knife or Scissors

Plastic **FOLDS** Uniform V-slits from hoop to trench

Doorway Plastic Cuts



Fold and Wrap Plastic round wood BATON and Nail to frame

SEASON EXTENSION

The aim is to produce a year-round trickle rather than temporary glut. Surplus can be problem!

Learn how to grow a specific crop in its regular growing season before trying it earlier and later. Study the Pattern of growth and the crop's Needs at different stages.

Try to grow crops in proportion to your own taste and Diet. Eating in Season means you have to wait until there is a Natural Seasonal Over-Indulgence (e.g. Strawberries)

Once you have a copious Ediculture, you can wander round Grazing direct from living plants! You can also listen to your own Cravings without getting fat.

FACTORS Your Soil or growing Medium will dictate how your plants grow, depending on what constitutes your Mothersoil (Loam, Clay, Sand, Silt), its Organic Matter Content and Colour. The more active and dynamic your soil and techniques, the quicker your plants will respond.

METHODS

- Some Bi-ennials can grow on as short-lived perennials if they are prevented from setting seed. (Kale)
- Forcing in the warm and dark will give an early and succulent crop from a perennial root (e.g. Rhubarb)
- Processing by Pickling / Jam / Chutney / Salting
- Storage Clamps / Cellars / Applestore
- Freezing / Drying
- Fermenting (Alcohol / Sauerkraut etc.)
- Structures - Siting / Aspect / Elevation / Microclimate / Shelter-Belts / Walls / Hedges / Fences / Fedges
- Extreme Weather / Heating / Lighting
- Cloches / Cold Frames / Hotbeds
- Greenhouses Materials / Use & Function

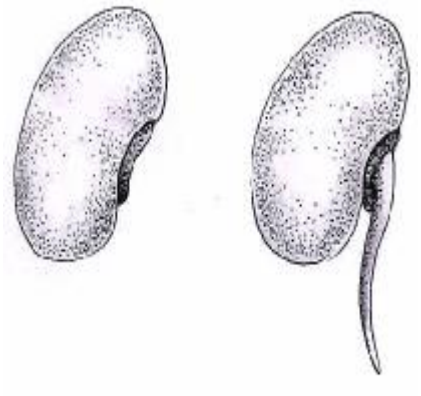

Eats...
seeds,
shoots,
leaves,
stems,
buds,
flowers,
fruits
and
roots

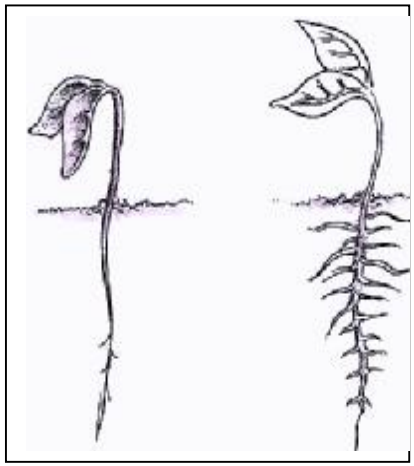
EIGHT STAGES OF PLANT GROWTH

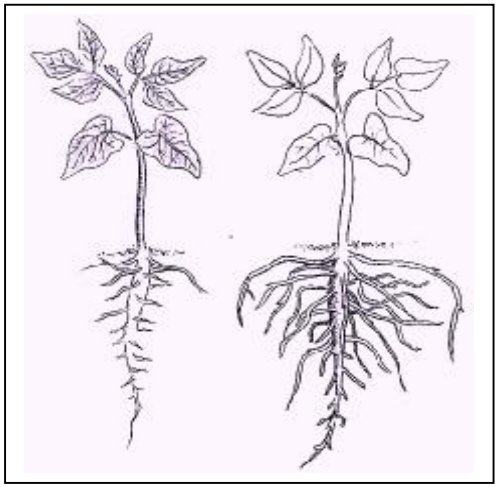
as Above so Below

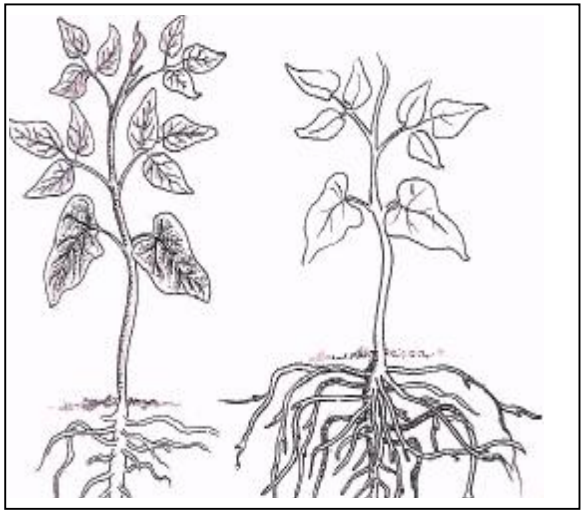
Upwards / Downwards

Expand / Contract









1. SEED

p **Swells + water /**
Radicle emerges q

2. SHOOT

p **Cotyledons emerge /**
Root hairs develop q

3. LEAVES

p **Mature Leaves /**
Roots extend q

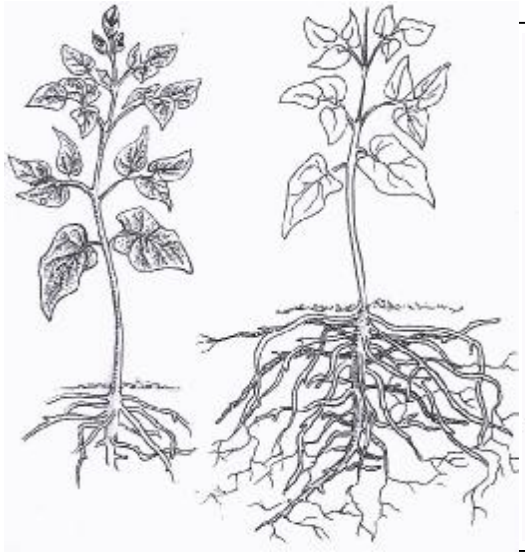
4.STEM / ROOT(Bi)

p **Rosette extends up /**
Adventitous Roots q

Malting	Bean-sprouts	Cut & Come Again	Asparagus / Beetroot
p Starch to Sugar	p Seed-leaves shoot up	p True leaves develop	p Increasing leaf area
q Seed root emerges	q Root branches	q Tap Root extends	q Roots explore
PLANT PROCESSES			
Nutrients from seed	Photo-Synthesis	Basal Rosette	Nitrogen Fibrous Rooting
ACTIONS AND INTERVENTIONS			
Sow + light heat	Pot on	Trans-plant	Support

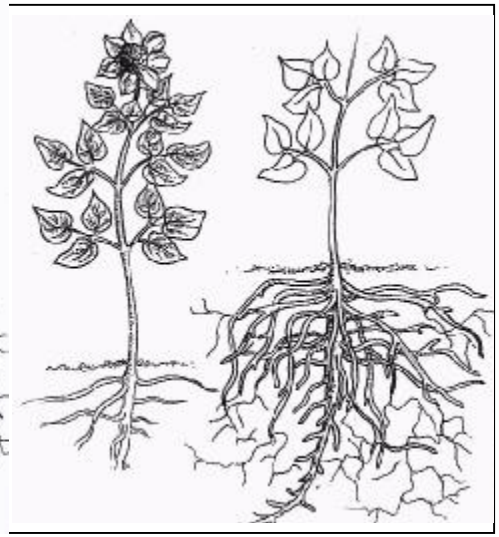
Biennials over-winter before stage 4

5. BUD



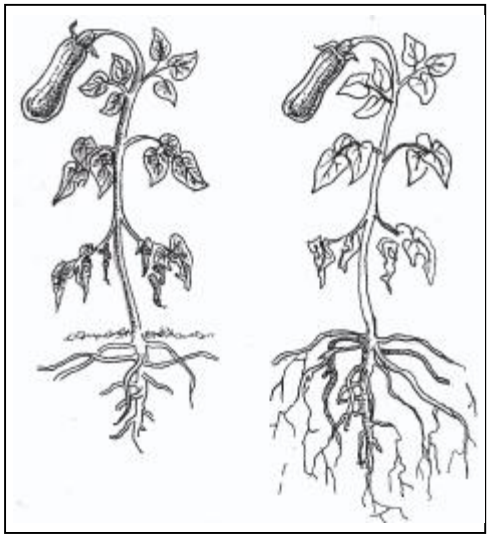
p **Foliage intensifies /**
q **Roots max. volume**

6. FLOWER



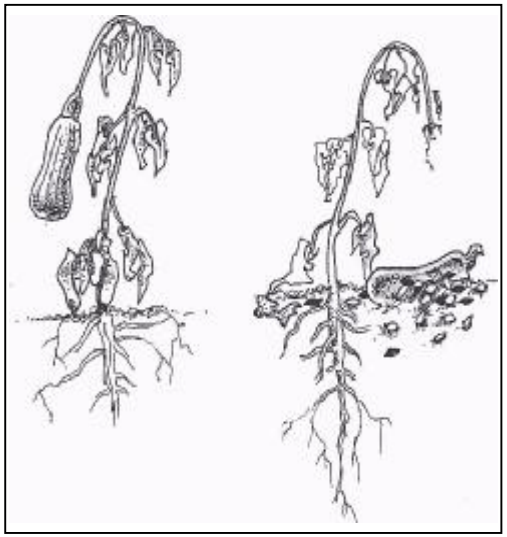
p **Pollination /**
q **Max. water**

7. FRUIT



p **Ovaries swell /**
q **Max. Nutrients**

8. SEED / ROOT (P)



p **Ripening / Distribution**
q **Root dies(A)/ Stores (P/Bi)**

Sprout / Cabbage	Cauliflower	Tomato	Grains / Artichoke
p Budding and max area	p Flowering	p Fruit/Seed formation	p Leaf-fall and die-back
q Rhizospere	q Max . water required	q Max. uptake of nutrients	q Root conserves energy
PLANT PROCESSES			
Mycorrhizal Association	Phosphorous	Potash	Multiplication/Division
ACTIONS AND INTERVENTIONS			
Mulch / Spray	Pollinate / Liquid feed	Harvest	Collect

Annuals complete cycle in one year **Perennials repeat 5-8 every year**

PESTS, DISEASES AND PROBLEMS

- Rarer, less devastating in organiculture
- Good practice = Genuine Preventative Protection: Soil Preparation / Regular T.L.C.
- Address causes not just disguise symptoms (Chemiculture)
- Plants want / are programmed to grow healthily and fulfill their awesome potential
- Intervene at first sign of problem, rather than too late / when proliferating (observations)
- Hand-rubbing at early stage(e.g. caterpillars / big bud)
- Panaceas: Seaweed / Humus (Bulky Organic Matter / Mature compost / manure)
- Often occur in combinations E. g. Insect Vectors + Virus
- Try to achieve / maintain a balance / equilibrium between predators and pests
- Problems may indicate imbalance & suggest solution (e.g. under- / over-fertilisation)
- Amend / adapt / improve cultivation practices
- Weather-dependant / Seasonal / Predictable
- Especially in protected Microclimates

PESTS: INSECTS: Aphids / Greenfly / Flea-beetle / Weevil / Larvae / Caterpillars / Woodlice / Earwigs / Millipedes

MOLLUSCS: Slugs / Snails

ANIMALS: Birds / Mice / Rabbits / Badgers / Livestock / Vandals

DISEASES: Rots / Wilts / Cankers / Viruses

PREDATORS (BIOLOGICAL CONTROL) Encourage Natural Food Chains
INSECTS: Ladybirds /Hoverflies /Lacewings /Spiders /Beetles /Centipedes
ANIMALS: Frogs / Cats / Birds / Foxes

COMPANIONS (Annual / Perennial)
Calendula / Nasturtium / Garlic / Chamomile / Comfrey / Balm
CROP COMBINATIONS: E.g. Brassicas + Legumes

SPRAYS (+ soap to stick)
SEAWEED General purpose foliar feed
QUASSIA Against Bugs Hot weather
HORSETAIL Strengthens / Protects Growth Cold / Wet weather
PRIVET / RHUBARB / URINE etc. (Dissuade / Smell)
LIQUID FEEDS / TEAS: Nettle (Nitrogen = Leaf growth) /
Comfrey (Potash = Fruit / Root)

SLUG CONTROL
Site Layout / Tidiness / Beds & Paths clear (Use weeds / cropwaste to trap)
Planks; Check regularly / after rain / Moveable / Surround Bed
Beer-traps: For Vulnerable Crops / Especially May-June
Mulch Management: Type (Wet / Dry / Time to rot / Surface Only) & Timing

INSECTS	CROPS	SYMPTOMS	CAUSE	TREATMENT
Slugs	Young / leafy	Wet weather/long nights	Inadequate control	Planks / beer traps
Snails	Young / leafy / aerial	As above / stone walls	Abundant Calcium	as above / Crush
Caterpillars	Brassicas	Inside central shoot	Butterflies	Net / variety / squash
Aphids	Any	Seedlings / young shoots	Secondary in susceptible plants Indicate infertile soil/ poor cultivation and irregular watering	Quassia and soap Horsetail - preventative Many other toxic sprays
Whitefly	Brassicas			
Blackfly	Broad beans			
Woolly Aphid	Apples	Wounds on trunk		
Root Aphids	Any rotting material	Damaged roots		Ignore
Scale Insects	Bay Laurel	Bark / under leaves		Rub off
Flea Beatle	Swede / Strawberry	Holes in seed leaf / fruit	Drought	Water / sticky yellow
Red Spider Mite	Aubergine/Cucumber/Corn	Webbing at top of plant	Too hot and dry	Quassia / Rape oil
Carrot Fly	Carrot / Parsnip	Damage inside root	Maggot	Protective fleece
Pea-Bean Moth	Peas	Fruit eaten inside pod	Maggot	Improve soil in future
Bean Weevil	Broad Bean	Scalloped leaves	Weevil in shoot	Hoe / mulch / pick off
Wireworm	Potatoes	Brown lines thru spud	Lifecycle - Couch	Mustard GM before
Vine Weevil	Perennial roots in pots	Necrosis / roots dead	Larvae	Don't buy in
Big Bud Mite	Blackcurrant	Round buds in winter	Maggot in bud	Prune / pick off
Sawfly	Gooseberry	Leaves eaten in May	Larvae feeding	Understorey managment Mulch / break cycle
Codlin Moth	Apples	Larvae in centre of fruit		
Leatherjacket	Roots	Young plants die		Cultivate soil
Flatworm	Earthworms	Moist / dark / shaded	Imported plantstock	Good Organic practice
DISEASES				
Viruses e.g.	Strawberry	Red spots on leaves	Aphids transfer sap	Remove old leaves
Necrosis	Anything	Extremity / older first	Nutrients to seed	Clear dead haulm
Mould	Raspberry	Warm / wet	Airborne spores	Maximise ventilation and sunlight
Mildew	Strawberry / Grape	Wet / humid		
Rot	Roots	Suppuration	Previous damage	Better cultivation
Canker	Parsnips / roots	Orange welts	Damage / age	
Chlorosis	Tomato	Yellowing leaves	Lack of Magnesium	Epsom salts / Mg lime
Blight	Potato leaf then tuber	Orange-brown spots	Spores in warm-wet	Remove foliage
Smut	Onions	Grey fuzz on leaves	Airborne spores	Clear foliage / Dry well
Scab	Potato	Raised welts on skin	Excess lime in soil	Cosmetic – peel
Rusts	Leeks	Orange spots on old leaf	Soil splash	Compost infected
Wilts	Cucumber / Tomato	Whole plant fails	Root/Stem damage	None
Tree Canker	Apples	Bark Wound to heart-wood, then ring-barking	Waterborne spores	Prune or cut out all infected wood
PROBLEMS				
Cultivation	Mechanical damage. Fertility and nutritional deficiencies. Address Root cause as well as symtoms			
Watering	Maturing	Splitting of roots	Excess / insufficient	Regular / moderate
Pollination	Fruit not set / Seed unformed	Lack pollinating insects	Too early / weather	Attract pollinators
ANIMALS				
Rats	Roots / Seed	Harvest / Storage	Hunger	Protect whole growing site – Netting / Fencing / Hedging / Walls Traps Deterrents
Mice	Seed / Grain	In store		
Rabbits	Leafy crops	Especially in winter		
Pigeons	Winter/Spring Brassicas	Young top shoots		
Birds	Cherries / Soft fruit	July		
Badgers	Roots / Parsnips	Winter		
Livestock	Everything in their wake	Anything anytime		

MOLLUSCS - SLUGS AND SNAILS

Molluscs are essential and useful participants in the ecosystem, helping to clear rotten and diseased plant-stuff, converting it into a form in which it can be reincorporated into the soil organic matter cycle. They are only usually an actual threat to young seedlings or soft maturing crops such as lettuces.

- **Time of Year** synchronised to coincide with plant growth / decay phases
- Sudden **emergence** in May. Especially in late, wet spring / early summer
- **Day / Night Length** Active during dark (including cloudy / overcast)
- **Weather Patterns** Short and long term
- **Rainfall / Moisture / Dew** Aids travel: up to 10 metres a night
- **Habitat** Wild / Undisturbed areas (= protected breeding areas)
- **Snails** indicate the presence of abundant Calcium
- **Only slugs** would suggest the conditions are Acid

1. CLEAR PATHS. Keeping paths weed-free creates a dry surface which is harder for molluscs to cross. Separates cultivated areas from wild vegetation.

2. PLANKS OF WOOD. Surround vulnerable crops with wooden planks which will create the cool, dark, moist conditions molluscs prefer. Check regularly, especially after rainfall and remove or squash.

3. COMPOST. Fully mature compost as a mulch. Well digested organic matter offers no food so molluscs will search elsewhere.

4. BEER TRAPS. Protect valuable crops by intoxicating your foe with diluted beer. Molluscs are attracted by sugar and alcohol dissolves them, leaving a foul-smelling mush. Set traps above soil level, so beetles don't fall in and drown. Cover container to stop rain washing it out.

Any trap becomes a home / hiding place if left too long, more than a week.

Slugs prefer to digest dead and rotting matter, so you can use cleanings and clearings as a trap or decoy to lure molluscs away from precious living growth by leaving it on paths, then remove crop-waste + pests to compost.

PLAN AHEAD **Reduce the population a month or two before a crop goes out.**
PREDATORS **Encourage frogs, toads, hedgehogs and the blackbirds into area.**
SITE LAYOUT **Design out the problem by creating a balanced ecosystem!**
RESISTANT CROPS **Large seeds, established transplants and vegetatively-propagated crops such as onion / garlic / shallot / tubers (potato / artichoke)**
DON'T bother with salt or anything which will dissolve with the first rains (pellets).
BARRIERS such as plastic bottles can be effective on a small scale, but can overheat, stressing young plants.

SLIME. Remove by rubbing hands with fine, dry soil then washing off. Repeat two or three times.

COMPANION PLANTING

Companions grow together in symbiosis, helping and benefiting each other. This chart shows you combinations of plants which will thrive if grown near or next to each other. This saves space because you can plant rows or patches of different vegetables quite close to each other or even together.

Two or more Crops are compatible in this way if they:-

- **make different demands on the soil (Shallow + Deep Rooting)**
- **use nutrients at different times (Fast + Slow Maturing)**
- **or have different needs for space (Tall + Short)**

Herbs and flowers, planted as companions, either in patches at the edges / ends of beds or dotted amongst the main crop, improve the health, vigour and flavour of crops and increase biodiversity.

However, some combinations of plants antagonise each other and do not grow well together, such as lime and acid-lovers or if they are too similar in colour, shape or demands on the soil / space.

CROP	Crop Companion	Herbal Companion	Antagonist
Asparagus	Tomato/Artichoke	Parsley / Basil	
Broad Bean	Potato/Cabbage	Marigold/Chamomile	Onions / Garlic
Climbing Bean	Corn / Celery	Sage/Savory/Thyme	
Beetroot	Onion/Kohl Rabi	Caraway / Dill	Beans
Brassicas	Potato / Beets	Mint / Nasturtium	Onions/Beans
Carrots	Onion/Pea/Lettuce	Chives / Chamomile	Dill
Celery	Leek/Cabb/Bean	Coriander / Dill	
Sweet Corn	Beans / Tomato	Basil / Nasturtium	
Cucumber	Radish/Sunflower	Chives / Dill / Basil	Potato
Leek	Carrot / Celery	Fennel / Salads	Peas / Beans
Lettuce	Carrot / Radish	Marigold / Chervil	Parsley
Onion	Spinach / Lettuce	Chamomile / Dill	Potato/Beans
Peas	Cabbage / Roots	Borage	Onion / Garlic
Potato	B Beans / Corn	Garlic / Nettle	Tomato/Squash
Radish	Pea/Lettuce/Cuc	Coriander	
Spinach	Strawb / B Bean	Dill / Chives	
Squash	Corn / Beans	Nasturtium/Borage	
Strawberry	Garlic	Marigold	Cabbage
Tomato	Basil/Onion/Bean	Marigold / Balm	Beet / Cabbage
Turnip	Peas	Marigold	

OPTIMAL PLANTING PATTERN

ABOVE GROUND: shoots / stem / trunk / branches / leaves / flowers / seeds / fruits
BELOW GROUND: tap-root / side-roots / fibrous / feeder roots / mycorrhizal association

A plant's root system can extend as far, horizontally and vertically, below ground as its aerial parts do above ground. Large trees can be observed to have a drip-line, a concentric circle, where their canopy of leaves sheds rain to the outer edges of the rooting zone, where its young, vigorous feeder roots are concentrated.

If allowed to, any plant will grow outwards in all directions, forming a progressively larger circle. As cultivators, we want our plants to attain the largest rooting circle possible for that plant. We can do this by providing uniformly-improved fertile soil without obstructions or obstacles, and reducing competition with other plants. This will allow each plant to fulfil its maximum cropping potential. Remember that most of our staple vegetables and fruits are huge compared to their ancestors and have been bred for larger size over hundreds of generations.

REASONS FOR USING PLANTING PATTERN.

- Maximises the use of space, soil, water and sunlight.
- Allows you to fit the maximum number of plants into the area available, providing sufficient space for each plant to thrive and attain its full potential.
- Efficient use of space is more important when:
  1. SPACE Limited land available.
  2. TIME Plants are long-lived and occupy the space for a long time (e.g. perennials / orchards).
  3. MONEY If plants are especially valuable or they need an expensive, protected environment. (e.g. seedlings in pots arranged in trays in a greenhouse)
- Minimises the area of bare soil.
- Prevents pests and diseases transferring plant to plant. Plants' leaves touch only when mature.
- Traditional spacings in rows force plants to grow in a rectangle. They are most suitable when the crop is best sown direct or where machines are being used. Optimal pattern means you only have to think of one distance, the diameter of the plant's rooting circle, which is equal to the distance from one plant to another in every direction.

1. RADIUS of ROOTING CIRCLE. How far roots spread from stem in every direction. The growing point is at the centre of circle and the feeder roots of the mature plant are at the edge

2. DIAMETER = SPACE BETWEEN PLANTS = PLANTING DISTANCE

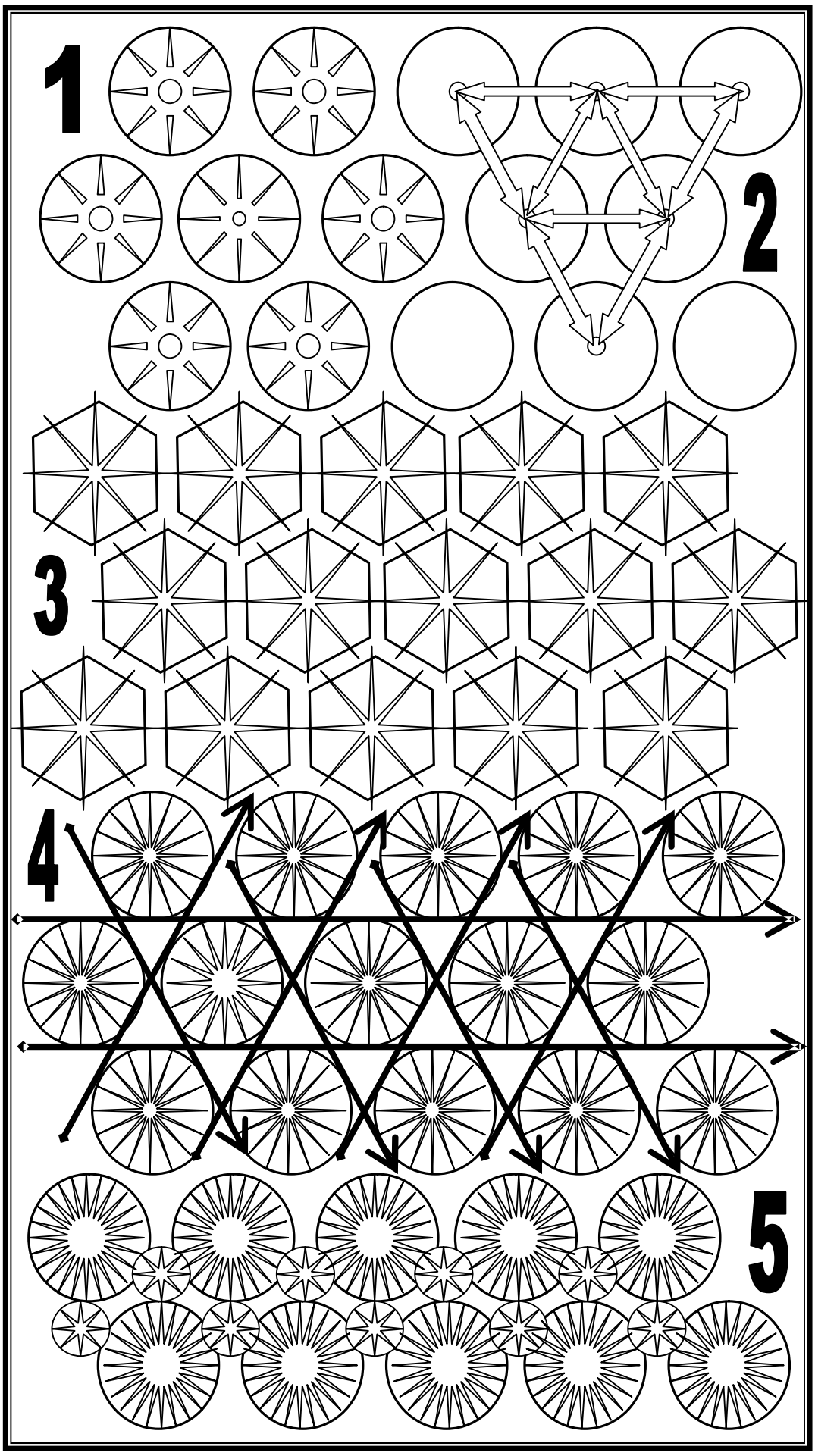
PLANTING PATTERN. The pattern to think of and form when planting out.
Forming an equilateral triangle, using the previous plant(s) as a reference point(s).
This can also be understood as a diamond pattern. It helps to imagine or mark a line perpendicular (at right angles) to the edge of the bed.
This can be made by a plank which can also be used to step on and distribute your weight.

3. HEXAGONAL PATTERN. When plants grow, they will use every bit of space available. This illustrates the hexagonal, honeycomb pattern which is the most efficient arrangement. Each individual plant is surrounded by six neighbours.

4. HOEING PATTERN. It is possible to hoe between the crop in three directions: laterally from side to side or diagonally in two directions. This makes it easier to hoe and weed without damaging plants. It is also possible to re-shape the soil around individual plants, to deliver water where it is needed at different stages of plant development and earth up around crops which need it.

5. INTERPLANTING. Smaller, short-lived catch-crop or companion planting between main.

Optimal Planting Pattern Diagram



WATERING – FACTORS

- Time of day / Day-night length.
- Temperature of water, relative to ambient soil (not air) temperature.
- Time of the year / Season / Sunlight – intensity / angle
- Shade – neighbouring crops / hedges / walls / trees (dripline)
- Weather – pattern / trend / prevalent type
- Frost – penetration / intensity / duration
- Wind – speed / direction North – Polar / Arctic / Cold
  West - Oceanic / Wet + East – Continental / Dry
  South - Mediterranean / Hot
- Humidity – Barometric pressure / trend – Highs / Lows / Fronts
- Rainfall – measure / estimate. Forms of precipitation.
- Duration / intensity of rain - Flash drains away / gradual soaks in
- Drought resistance / tolerance – e.g. perennials / established crops
- Clouds – patterns / cover – direction(s)
- Rainbows (42½° / double / multiple)/ isothermic clouds
- Dew formation / frost-melt – dew-pools / soil sculpture
  – sufficient for germination / watering?
- Stage of crop development – requirements / rooting area
  – pattern of water use, peaks after flowering to fruiting
- Transpiration – Leaf area / permeability
- Water requirement of crop (Thirst) continuous - salads / watery / leafy
- Pampered Vs. Hard-grown
  – excessive / too often, plant expects and needs more – lazy root-system
- Stress – Fruiting / Aromatics response to stressing – techniques
- Mulching – depth / colour / water-retentive
- Soil - Humus content (sponge) / Bulky Organic Matter -
  - Structure / Worm activity – Nature / Mothersoil / Subsoil
  - (Loam – Clay / Sand / Silt) Depth of topsoil –
  Storage reservoir - Saturation / capacity – rate of shedding / run-off
- Drainage and aeration – Slope / Paths / Beds / Ridge & Furrow /
  - Ditches / Winterbournes
- Site – topography – valley / high ground / north- or south-facing
- Application method – Can / Rose / Bucket / Irrigation / Hose / Spray
- Planting patterns – Row / Bed / Individuals – Conservation / minimise
- Collection and Storage = more than maximum daily requirement
- Availability – Rainwater Vs. Tapwater

Alternating Periods of...

DROUGHT *QUASSIA / SEAWEED*

DURATION / INTENSITY / SEASON
HEAT / WIND / RELATIVE HUMIDITY
SITE – Water supply / Shelter-exposure / Slope N-S
SOIL / SUBSOIL – sand porous vacuums moisture / clays bake and split
ALLEVIATION:

- Early planting maximises chance of rainwater
- Deep-drilling – wide scoop (water direct to seed/ling / microclimate
  - decreases wind stress and evaporation / helps earthing up later)
- Mulching – Light-reflective / Thick-retentive / Heavy-feeder
  - Materials – compost / soil / dust / card / weed / sawdust etc.
- Interplanting / Companion Planting / Root symbiosis
- Cover-crops / weed- cover / living mulches
- Cultivations (timing) – Hoeing after cover before weeds set seed
- Raised beds = Deep beds – increased depth/volume of improved soil
  - increased land-tide / water table effects
- Sufficient water for existing root volume - and dripline / feeder roots
  - More to encourage root extension / water microbial zone (e.g. myccorhizal association)

and FLOOD *HORSETAIL (SILICA)/ QUARTZ*

PROLONGED / INCESSANT / HEAVY / CONTINUOUS RAIN / MONSOON / STORM / DOWNPOUR / the heavens open

- Slug and Snail heaven – 30 Ft + in a night
- Waterlogging / Anaerobic / Drowning - necrosis
- Rank / Weak growth + large, dilute cells & pores
- low mineral & oil content
- Vulnerable to Fungal Rots / Moulds / Blight / Smut / Damping off
- Leaching of soluble nutrients e.g. Magnesium (Yellowing / Chlorosis)
- Splitting of fruits / Excess weight breaks boughs
- Absence of Pollinators
- Lazy, insufficient root-system
- Growth rate spurt and dip
- Mud – hazard (colloidal flow dynamics)
- Workability – what cultivations possible how long after rain
- Accessibility – Beds / Paths / Layout - shedding excess
- Collect / intercept / divert / store / delay / retain

LIQUID FEEDS AND SPRAYS

Whilst it is a basic tenet of organic cultivation that one feeds the soil not the plant, it is nevertheless useful at certain times to use liquid feeds, and some preparations are useful sprayed on foliage;

To encourage heavy cropping, the right liquid feed at the right time can help. The feed must be applied during good growing conditions (warm/sunny) before the plant is mature. For example, feed tomatoes when they start to flower; cabbages before heading up.

It is also important to remember to apply on to wet soil, or after crop has received sufficient watering, so that feed does not leech away and can effectively be absorbed by plant root hairs.

- Ø Liquid feeds especially useful when container-growing, where plant roots are restricted and available nutrients may become exhausted.
- Ø Liquid feeds can in most cases be used as foliar sprays, to supply nutrients through the leaves, especially on ailing, stressed plants.
- Ø Specific preparations can be made up to use as plant tonics, or to ward off/discourage the onset of pests and diseases.
- Ø Dilution: 10 parts water to 1 part preparation as starting point. Too strong concentration can harm plant or have detrimental effect on taste.

SEAWEED Widest range of available nutrients plus growth hormones. As liquid feed use on transplanted seedlings, and crops at flowering/heading up stage. Use as spray on plants suffering any form of stress. Home made from seaweed meal; ferment 1 kg in 25litres ~8 weeks. Dilute 20 - 1 for liquid feed, or strain and dilute 5 - 1 for foliar spray.

MANURE/COMPOST Infuse half a hessian-sack full of manure or compost in a large barrel of (rain) water. Steep for 2 - 4 weeks. Dilute 10 - 1. Especially useful for heavy feeder crops, leaf crops such as brassicas. Strained, can be used as spray; good all-purpose tonic for stressed crops. Different manures have specific benefits. (See handout on Manures)

COMFREY High potash levels make it ideal for heavy feeder fruiting crops such as tomatoes, aubergines and peppers. Made by nearly filling a container with comfrey leaves and topping up with water. Leave to ferment for a few weeks, stirring daily if possible. Dilute 5 - 1. Very smelly! Alternatively a concentrate can be made by filling a lidded container with comfrey, and collecting the juice from a tap or hole in the bottom of the container. Dilute 15 - 1. will store for a long time, and preserves more of the available nitrogen.

NETTLE Collect in spring for best quality. Contains useful amounts of nitrogen, plus some phosphate annd potash. Also useful amounts of magnesium, sulphur and iron. A general-purpose liquid feed. Good combined with comfrey for heavy feeder crops. Prepare and apply similar to comfrey. As a spray, applied frequently, nettle can make crops taste unattractive to sap-sucking bugs.

WORM BIN LEACHATE Excellent general purpose feed, especially container grown plants. As strength and consistency can vary, dilute 15 - 1; use less dilute upon appraisal.

HORSETAIL TEA *(Equisetum arvense)* Spray onto crops during dull, damp cool days; silica content helps bring light into plant tissues and ward off infection from fungi/mildews. Boil spring-collected horsetail for 20 mins. Store in bottles.

CHAMOMILE TEA Infusion sprayed on seedlings to protect from damping-off and mildew.

CHIVE/GARLIC JUICE Diluted juice as spray against mildew on crops such aas cucumbers.

VALERIAN FLOWERS (*Valeriana officinalis)* Infuse the flowers. Can be used against mildew on maturing crops at end of season, especially tomatoes.

QUASSIA CHIPS Spray on crops affected by aphids; renders aphids unable to feed - quassia extremely bitter. Boil chips in plenty of water for 30 mins.

PROPAGATION Techniques	**Examples**
SOWING Cover seed twice as deep as seed is long	
SELF-SOWN VOLUNTEERS	Claytonia / Celery
DIRECT	Carrots
CONTAINER-SOWN	Pepper / Aubergine
PRICKING OUT	Celery
POTTING ON	Basil
SEEDBED	Lettuce / Brassicas
TRANSPLANTS Pots / Trays / Boxes / Strips / Root-Trainers / Soil Blocks	
DIVISION **Perennials – Lift / divide / replant or pot on**	
BULBS / CLOVES	Garlic / Shallot
BULBILS	Leeks / Rocambole Garlic
SETS	Onion
ROOT / OFFSET	Sorrel / Rhubarb
TUBER	Potato
RHIZOME	Skirret
CLUMP	Chives / Alpine Strawberry
RUNNERS	
AERIAL	Strawberry
ROOT RUNNERS	Mints / White Valerian
LAYERING (Tip / Branch / Air-)	Loganberry / Apple / Fig
CUTTINGS	
ROOT	Comfrey / Horseradish
EYE / CHITTING	Potato
HARDWOOD	Willows / Currants
SOFTWOOD / SEMI-RIPE	Rosemary / Gooseberry
HERBACEOUS	Lemon Geranium
LEAF	Begonia
SHOOT / SLIP	Clove Pinks
BUD	Grapevine
GRAFTING	Top Fruit
STOOLING / SUCKERING	Blackcurrant / Hazel
MICRO-PROPAGATION	Any
SPORES	Mushrooms

GROWING MEDIA

The table (overleaf) sets out the proportions of ingredients in a basic range of potting composts as a ***percentage***. Each mix has distinctly different uses and properties. Making your own mix allows you to produce exactly the right medium for intended use.

The list progresses from mixes which require minimum fertility and a structure which will encourage cuttings and small seeds to form strong root systems, to those which need added fertility to allow established plants and seedlings to grow on strongly. Ingredients arranged similarly, from those which are more **structural and inert** (left), to those which are more ***fertile*** (right).

This selection maximises the use of ingredients which can be obtained freely from local sources. Good organic practices should include managing all the resource cycles which will make these ingredients available: making garden **compost, leafmould, loam** and creating improved, weedfree **topsoil**. Saving money by sourcing bulky ingredients yourself means you can afford the inputs which have to be bought in, such as perlite, vermiculite and concentrated fertilisers. These more expensive ingredients can be reduced or even omitted, but this will reduce the effectiveness of the final products.

Powdered lime, dolomite or calcified seaweed can be added to suit the requirements of lime-lovers, such as onions and cabbages. Rockdusts can be added if a long, slow release of fertility is required. Media for acid-loving, ericaceous plants can be produced by using leafmould made out of evergreen leaves or composts that have been digested anaerobically.

Mixes which include soil are more resilient and long-lasting. Soil acts as a buffer producing a more enduring and forgiving medium which requires less regular watering and will last longer before it needs to be replaced. Using soil in potting media produces plants which are prepared for and adapted to the type of conditions they will encounter when they are transplanted.

TIPS

- Mix bulky ingredients together first, then add concentrated fertilisers.
- Add perlite or vermiculite next to check the concentrates are distributed evenly throughout the mix. Move the batch from end to end of a container to make sure it is mixed thoroughly.
- Rubbing the finer mixes by hand adds minute amounts of enzymes, hormones and auxins which can promote growth.
- Most mixes can be used immediately, but those which contain volatile substances (such as raw compost / blood, fish & bone) should be left to settle for several days.

RIDDLING **1 cm / half inch** mesh produces fine particles for seeds
2 cm / one inch produces rough grade material suitable for potting on media.
Larger stones / twigs can be saved and used for drainage in pots.

Stones that do not pass through the riddle can be saved for use as grit.

GROWTH MEDIA *Make your own "Potting Compost"*

%	INGREDIENTS											
	PHYSICAL Inert / Structural			BIOLOGICAL Bulky Organic Matter						CHEMICAL Fertile		
	GRIT	*SAND*	PERLITE / VERMIC.	LEAF-MOULD		LOAM / SOIL		COMPOST		SEA-WEED	BLOOD, FISH & BONE	ROCK DUST
				Fine	Rough	Fine	Rough	Fine	Rough			
CUTTINGS →	20	20	30	30								
SEED small →		30	30	40								
SEED medium →		18	30	40		10				2		
SEED large →		10	25	30		20		10		3	2	
SEEDLING PRICKING OUT →			27	50		10		10		2	1	
POTTING ON Young →			20		22	25		25		5	3	
POTTING ON Large →			10		20		30		30	2	5	3
MATURE / PERENNIAL	10				20		50		10	2	3	5

Herbalism

80% of the World's population still rely on plants as their main source of medicine. People in different countries use different herbs (according to what grows locally) - they also have different traditions and beliefs around healing. Here are some of the main systems of herbal medicine....

Ayurveda

An East Indian System over 5000 years old. Means 'the science of life' and is an all-encompassing approach to living. Includes consideration of how environment, diet, lifestyle etc affect health.

Every individual has a dominant constitution or 'dosha' (Vata, Pitta or Kapha) – herbs & treatment are chosen not just for their **specific actions** (eg a cough relieving herb) but for their **'energetic properties'** (eg hot, cold, dry) and how these will affect a person's dosha.

Traditional Chinese Medicine (TCM)

Has the same roots as Ayurveda. Also considers lifestyle and diet an integral part of healing, and prescribes herbs which have the right 'energy' for the person.

Herbs are almost never prescribed singularly but instead are given in combinations (formulas). There are hundreds of these, with hundreds more variations of each!

Western Herbal Medicine

Eastern healers also influenced the medicine system of ancient Greece, and the **four humours** (Earth, Air, Water, Fire) formed the basis for assessing constitution and treating disease in western (herbal) medicine for many years.

Today western herbal medicine has moved away from this approach. Herbs are used to treat a condition or a disease but they are not necessarily varied according to the patients' constitution. More emphasis is also placed on the chemicals in the herb.

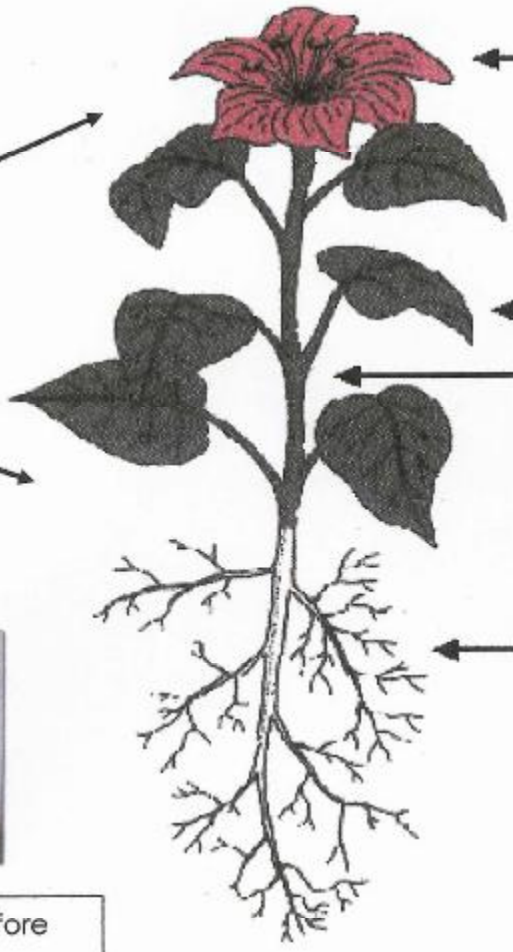
Others include....

Native American, Tibetan and Japanese Traditional Medicine systems.

AND FINALLY... None of these systems have grown in isolation. There are many crossovers with shared herbs and beliefs. There are also many different schools of thought in each system; some people say there are as many types of herbalism as there are herbalists.

Harvesting Herbs

Aerial parts – of plants high in volatile oils in morning after dew has dried & before heat of the sun. Or in the evening.



Flowers just before they are fully expanded

Leaves when they are fresh & young – usually before the development of the flowers which use the plants energy

The herb (which generally means the whole plant including leaves, stems, foliage & root) should be gathered when it is in flower

Roots & root bark: of perennials - should not be gathered until after 2 or 3 years of growth: Of biennials - in late fall of the first year after the aerial parts have died back and the sap has returned underground. Or in the early spring of the 2nd year before the sap is again rising.

Fruits & Berries – just before they are ripe

Bark – in late autumn or winter. Usually the inner bark is used. Never strip around a tree

Seeds – when they are fully ripened

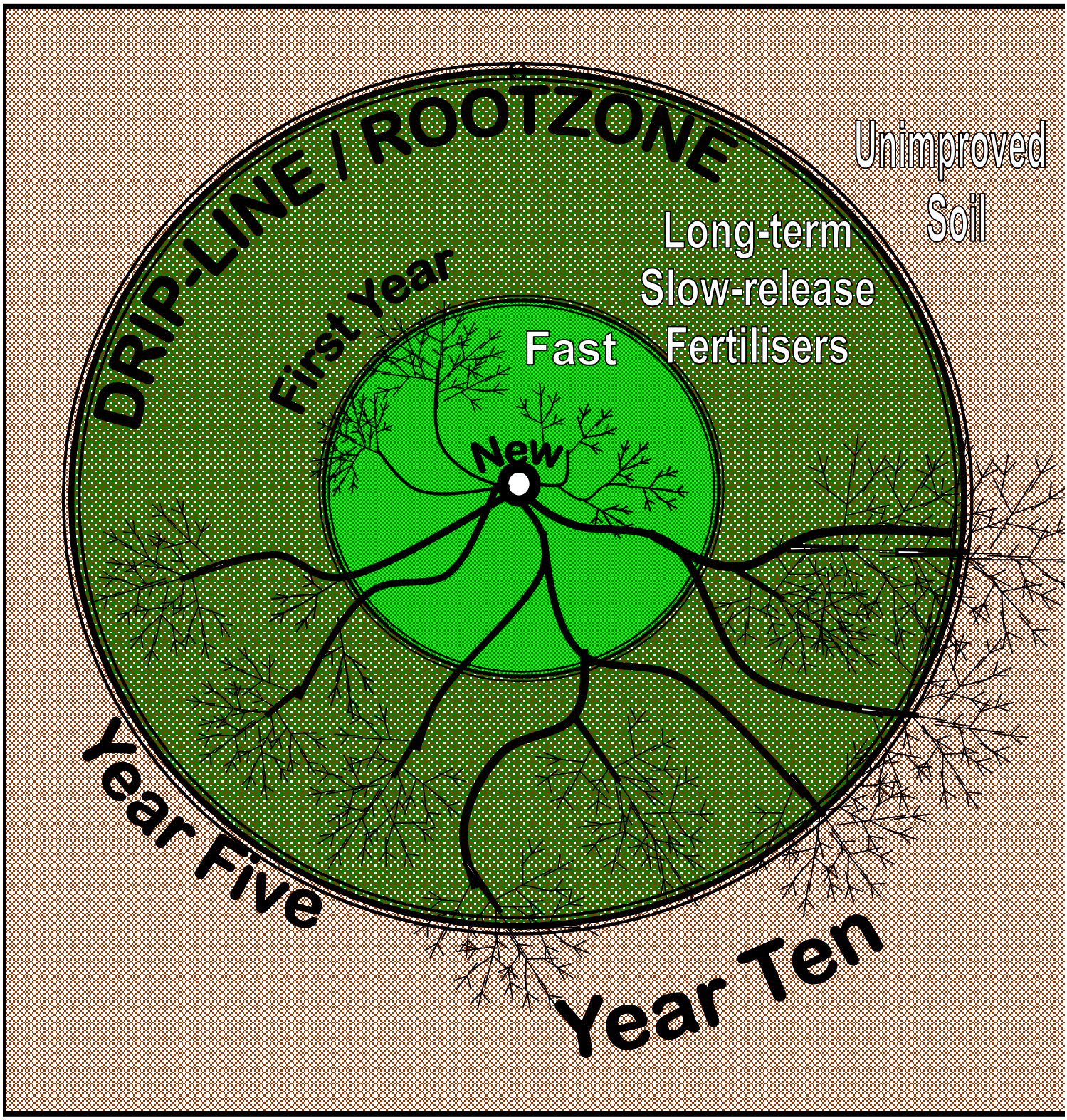
General hints...

- Gather only from healthy plants
- Leave enough fruit, seeds and flowers for the plant to continue to live healthily.
- Once harvested, dry in a warm place away from light - hang them in the shade, or place them in paper bags.
- Always label things – you think you'll remember but chances are you won't!
- Harvest herbs as far away from roads as possible

ROOTZONE

Water and mulch at the DRIP-LINE, where fine, fibrous roots feed.

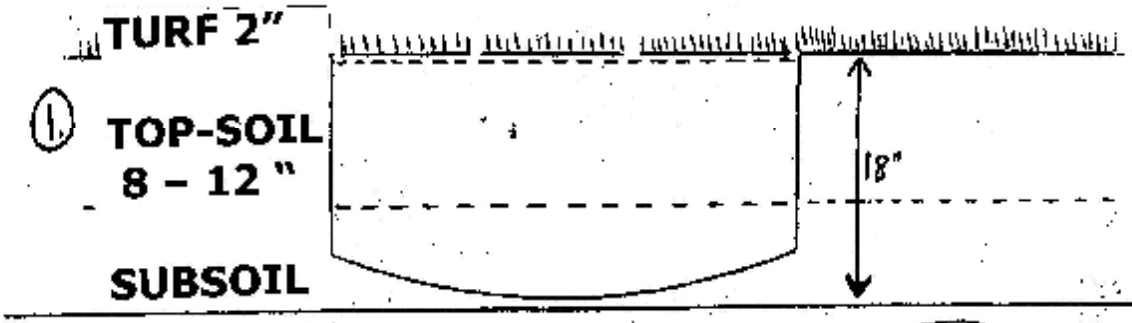
Tree root systems expand in a circle over many years, as annuals do in months.

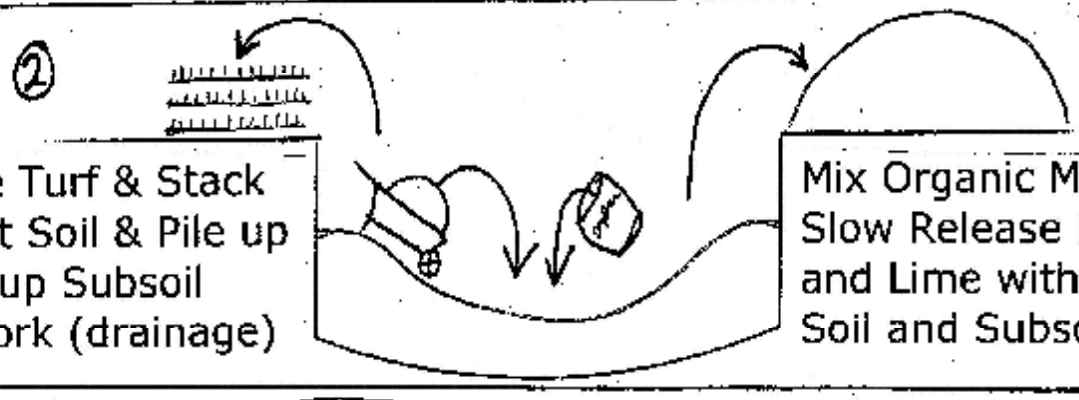


Inner Circle **50 cm**

Outer Circle **1 m +**

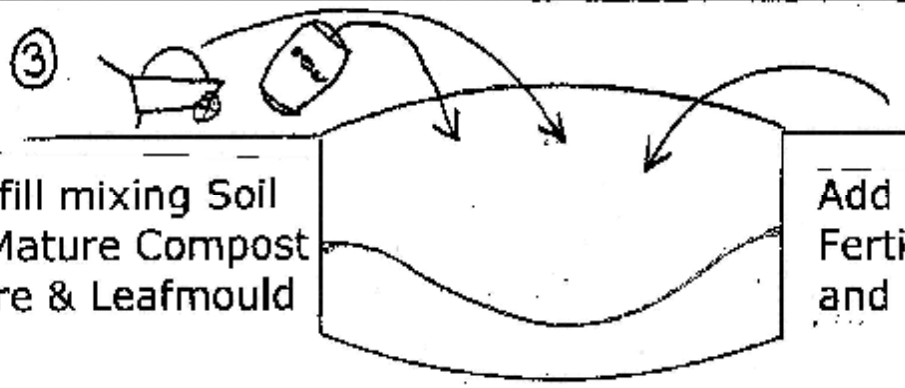
Planting Fruit Trees





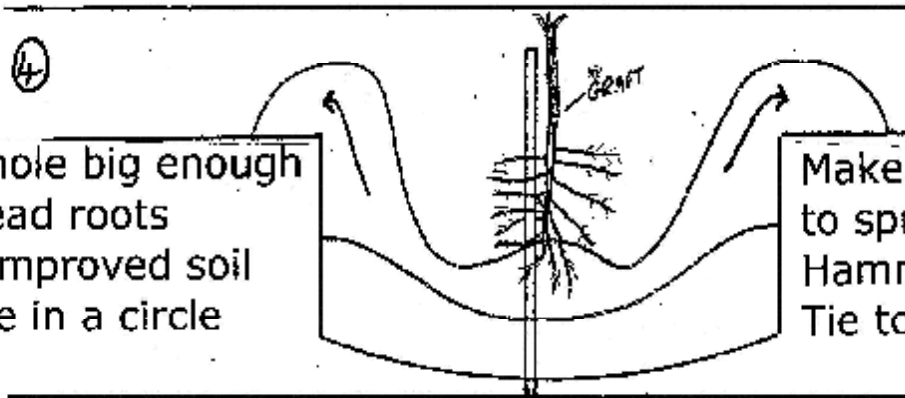
Scrape Turf & Stack
Dig out Soil & Pile up
Break up Subsoil
with Fork (drainage)

Mix Organic Matter,
Slow Release Fertiliser
and Lime with both
Soil and Subsoil



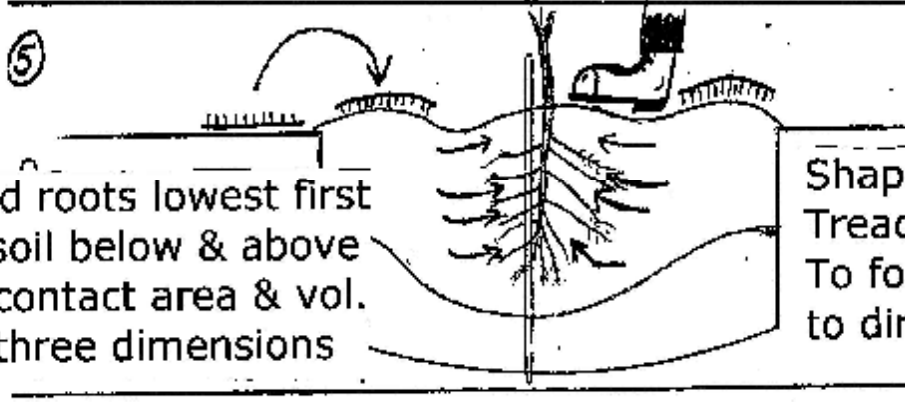
Back-fill mixing Soil
with Mature Compost
Manure & Leafmould

Add Quick-release
Fertilisers in center
and Mix thoroughly



Dig a hole big enough
to spread roots
Move improved soil
to edge in a circle

Make a mound for roots
to spread out and down
Hammer in the Stake
Tie together above graft



Spread roots lowest first
Pack soil below & above
Max. contact area & vol.
in all three dimensions

Shape soil into a mound
Tread firmly with heels
To form a circular moat
to direct water to roots

PLANTING FRUIT AND PERENNIAL CROPS

What follows is an attempt to comprehensively describe all the actions necessary to increase the plant's chances of attaining a productive, healthy and long life. This information is compiled from many sources and suggestions, over many years of practical experience.

Purchase **OPEN or FIELD-GROWN** stock, which will have a natural root-form, in the DORMANT season, rather than POT OR CONTAINER-GROWN, which are more likely to have ingrown and restricted roots and may have spent too long in too small a pot. If you can only obtain potted stock, ensure that the ROOTBALL is thoroughly disentangled when the plant is transplanted or potted up.

YOUNGER plants [1-3 years] will probably become re-established in their final positions more quickly than older [3-5 year old]. Nursery growing conditions will have been as close to perfect as possible, to ensure maximum growth in the stock offered for sale. Care should be taken to try to ensure that these high levels of fertility are maintained during the first 5-7 years while the tree is becoming established in its final position. Unimproved soil will check tree's growth in its formative years, postponing its full establishment and cropping.

SOIL IMPROVEMENT should aim to allow the plant to fulfill its prodigious growth potential, first by remedial, mechanical addition of enough bulky organic matter to render a sufficient area and depth of soil readily penetrable by the plant's roots and secondly by the addition of sufficient concentrated long-term, slow-release fertilisers to allow the tree to generate a sturdy and balanced structure of healthy wood which will be capable of bearing the weight of many years' fruit crop. Imagine that each tree may produce hundreds of pounds of fruit annually when it is mature. The future return justifies a generous investment to help guarantee that outcome. Spend at least the value of the plant on feeding its formative growth with bulky organic matter and concentrated fertilisers. Once fully established, the plant will be capable of exploiting all the indigenous, unimproved soil available to it.

SPACING. The size of the mature tree is dependant on the vigour of the rootstock which the fruiting wood has been grafted onto. The full extent of growth of various rootstocks vertically and laterally are as follows; dwarf 5-10 ft, bush/semi-dwarf 10-15 ft, half-standard 15-20 ft, full standard 25 ft

AFTERCARE. The purpose of following the complete instructions for planting is so that the tree can be provided with all the conditions needed to succeed with as little ongoing intervention as possible. Problems later in the life of perennial fruiting crops can most often be directly attributed to insufficient soil preparation and care when planting.

WATERING. Copious amounts of organic matter in the vicinity of the young plant's roots will help to guarantee that it does not die even during prolonged drought. However, an extended period of dry weather during the tree's first period of growth in its new situation, during the hot, long days of late spring and summer [May to August], could severely restrict growth and delay the young plant's establishment until the following year. If drought lasts for more than four weeks during this period, water thoroughly [50-100 L] and repeat every fortnight.

MULCHING AND WEEDING. In the first few years of a tree's life, its root system will extend outwards in the soil at the rate of about 15cm/6 inches in each direction each year. Care should be taken to ensure that weeds do not out-compete the tree's roots for moisture and nutrients over the whole rooting area especially at the drip-line, which corresponds to the outer edge of the rooting circle, where most of the tree's fibrous feeder roots are. Young plants should only be mulched with permeable materials which will readily allow rainwater to penetrate straight through to the roots.

PRUNING. During the first 5 years of the tree's life, it is possible to form the skeleton or superstructure which could bear the weight of crops for many decades into the future. Careful attention to the removal of any small pieces of dead, diseased and damaged wood will help to reduce the chances of minor ailments developing into major problems. Try to read the present shape and habit of the tree and allow its natural form to be expressed. Assess its current shape first in the three dimensions of space and then project this forwards in time to what it will develop into in one, five and ten years

PLANTING SEQUENCE

1. Dig hole 3-4 ft [1m+] wide & 12-18 inches [30-40cm] deep. Put topsoil into a mound on one side.

2. Break up the subsoil in the bottom of the hole with a fork to ensure good drainage under where the roots will grow and remove any large stones or obstacles to root growth.

3. Fill half the hole with rough organic matter and fertilisers that will take 3-5 years to break down. Using a fork, first mix with some subsoil and then a couple of spadefulls of topsoil.

4. Overfill the rest of the hole with more mature organic matter and short-term, soluble fertilisers [such as aged compost and seaweed]. Stir the mix with a fork again bringing up a small proportion of the rougher lower half. Add more topsoil until there is 50% soil in the mix.
This completes the radical preparation of the soil to ensure the plant thrives in its first few years and forms a strong and healthy structure. This operation can be carried out during the longer days and better weather earlier in the year [September-November], allowing the additives to settle and be consolidated, and permitting much quicker planting if required during the dormant season [Dec-Feb].

5. Dig a hole into the mixture 18 "/40cm wide and deep, larger if roots are up to a foot [30 cm] long.

6. Form a mound of improved soil at the bottom of the hole.

7. Spread out the roots in a circle in all directions and place it gently onto the mound.

8. Check that the graft point is 2"[5cm] above ground level to stop the fruiting stock from rooting and if possible that the graft wound faces towards the sun [south] so that it stays dry and heals over.

9. Place the stake between the roots so that it meets the tree without disrupting its branches and supports it vertically. Holding the tree away, push the stake into the subsoil and drive it in a further 6-8"/15-20cm with a lump-hammer. Check that the tree and stake are still positioned correctly and adjust either as necessary. Except in especially exposed, windy sites or on light soils, using extremely dwarf rootstock, a stake that protrudes 12"/30cm above soil level will be sufficient to protect the tree, without making it dependant on support.

10. Tie the tree and stake together loosely at the point where they touch making a figure of eight between the two, using strips of rubber [1x12"/3x30cm] or other soft, elastic, non-synthetic materials.

11. Tease out the lowest main roots from the root-ball and spread them radially to cover as much area available as possible. Remove any broken roots. Settle the main and/or fibrous roots into the mix pointing outwards and hold them in place with improved soil mix. Firm down gently with the knuckles or palms of your hands. Aim to guarantee maximum contact between the roots and soil so that the plant can draw on the greatest area possible as soon as it starts to grow in the spring.

12. Identify and separate roots growing further up the taproot and attempt to create a second circle of roots 2"/5cm above the first. Vigorous rootstocks may have enough growth to permit a third circular tier or level of roots to be arranged.

13. Cover the highest roots with 4"/10cm soil mix and press firmly with your fists. Firm pressure minimises the danger of leaving an air or water pocket near the roots which could damage them or even make the tree unstable. The further away from the plant's stem, the harder the pressure can be, since the mix acts as a buffer protecting the roots from damage.

14. Loosen and stretch and tie the rubber so that the stake is firmly supporting the tree.

15. Spade another 6"/15cm of mix and topsoil around the tree and tread down to form a slight mound all around. With your toe pointing towards the trunk, stamp the ground down with your full weight, so that your heels create a circle of well-compressed soil 12"/30cm radius around the tree.

16. Fork over a circle of topsoil outside the compressed soil to bring the whole area back to level.

17. A second, less substantial stake [such as a simple bamboo cane tied with soft string] can be used to supplement ground-anchor stake whenever a plant is especially tall or on an especially windy site. On well-protected sites, the anchor-stake can be omitted and the cane used for first year only.

PRUNING

A Tree can be understood as an organism whose shape and structure record every detail of nutrients, rainfall, weather and seasonal change over its lifetime (just as Dendrochronology - tree rings – can tell us when a piece of wood grew). To prune, we need to predict what would happen naturally over time and intervene to anticipate changes. i.e. Instead of waiting years for a diseased branch to die and drop off, we can remove it immediately.

Over time, any fruit tree or bush grows like a **FOUNTAIN** of water, new growth pushing up vertically, cascading horizontally and falling to ground.

AUXINS – concentrated in terminal buds / vertical branches.
Growth hormones from roots promote Leaf / Extension growth
at the highest point directly above where the trunk comes out the ground.

SHAPE - Create a balanced form, in 360^{o}, like a **goblet** or **wine-glass**.
- Reduce crowding in the centre and remove shaded growth lower down.
- Try to generate optimal sun exposure + ventilation.

EQUILIBRIUM Root system capacity to supply water & nutrients to Canopy
STRESS produces more flower and fruit
- Weed competition /Drought /Predation /Disease

WHY PRUNE? Huge cropping potential of Cultivars needs controlling
1. SIZE – Fewer, bigger fruits OR More, smaller
2. QUALITY – Better storage - Less seconds / mis-shapes / bruised
3. PEST and DISEASE - Codlin / Sawfly / Canker / Silver Leaf / Scab / Birds
4. ACCESS / PICKING HEIGHT
5. Continuous Cropping (rather than Biennialism)
balances wood-leaf and flower-fruiting growth.

ROOTSTOCKS determine vigour / size of mature plant / time to cropping

Height/Spread/Diameter		**Apple**	**Pear**	**Plum**
Cherry				
Extreme Dwarf	6' 1.5 metre	M 27		Pixie
Dwarf	8' 2 m	M 9		Colt
Bush / Semi-dwarf	12' 3 m	M 26	Quince A	St. Julian A
Half-standard	20' 5 m	MM106 / MM111		
Standard	30' 7 m	M 25	ba29	Myrobalan

FRUITWOOD *(SCION)* each variety has its own individual characteristics and requirements, such as its vigour or whether it tends to fruit more on the mature **Spurs** of older wood or the **Tips** of new growth.
GRAFT Vital to stop Scion rooting. Ensure Graft above soil level.

Assess/ inspect whole plant in relation to surroundings /all angles.

ORDER:- 1st - TRUNK 2nd - BRANCHES 3rd - TWIGS

1. Remove all **Dead, Dying, Diseased and Crossing** wood.
2. **Check, clear and clean** old wounds, dead and aborted buds /bark /galls.
3. Fill available volume in all **3 dimensions** of Space and then project Shape forward in **Time**, to be strong enough to bear weight of future crop.

AGE - 4 basic types of Pruning for trees in different conditions:-

1. ***Formative*** 1-5 years according to vigour / habit / longevity / rootstock
2. ***Recovery*** 5-10 taming wild / reshaping / remove broken & damaged
3. ***Regenerate*** 10-50 each year, remove 1/3 branches over 1 inch for 3 yrs
4. ***Radical*** 50+ back to trunk / skeleton / pollarding / coppicing

WINTER Big branches / major restoration, easy to see shape when bare
SPRING Tips - remove distorted / discoloured emergent growth
SUMMER Shorten new - encourages fruiting buds / train to special shapes

PRUNUS = Cherry, Plum, Damson, Gage, Peach, Nectarine, Apricot, Almond
Prune STONE FRUIT only when sap flowing, to help heal wounds quickly.
(Peach Leaf Curl – protect new leaves from rain late winter / early spring)

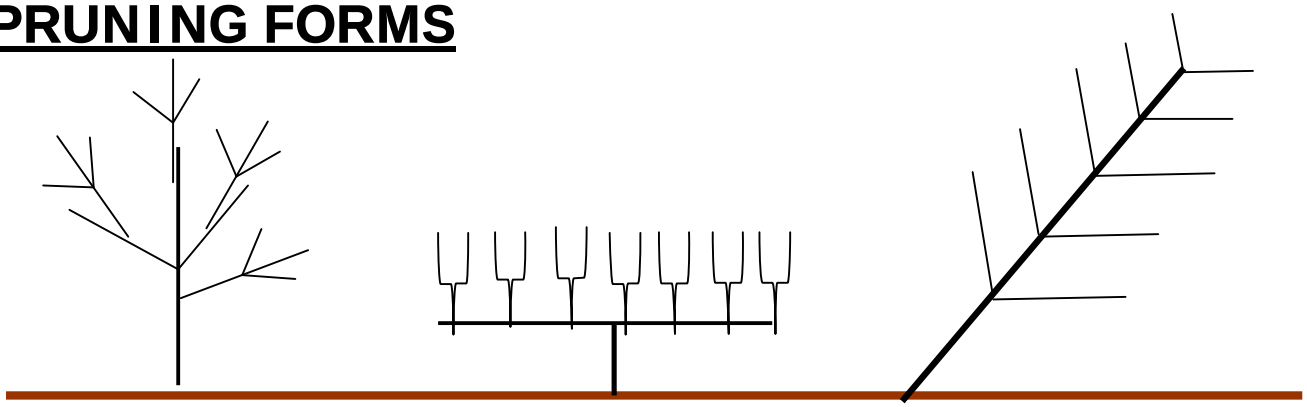
BUDS: Flower Short, fat, round / clusters / fruiting ***spurs***. 2nd year wood.
Woody/Extension Growth Thin / point toward future growth). New wood.

CUTS New growth towards space in direction of the last remaining bud
SMALL (+ Secaturs) 1/8 of an inch / 2 mm from last bud / parallel to bud
LARGE (+ Saw) Cut through wrinkled ringed bark at base of branch
Remove weight of large branches with a bow saw before making pruning cut
Leave exposed wood mirror smooth / slope to allow rain runoff, not collect.
WOUND-HEALING Healthy circular welt of bark to cover cut @ 1 cm p.a.
SWEAT (Salt + Growth Hormone) or Bio-dynamic paste (+ Clay)
(instead of Pruning Compound = chemical fungicide)

FESTOONING (June) Tie / Weigh down branches to create a Weeping form
SECONDARY CROWNS Next set of horizontal / structural branches
DRIPLINE Concentric circle, wide as canopy, where new, fibrous, feeder roots form. Needs mulching / weed-free until tree reaches mature stature. Cultivate to regenerate older trees.

Extreme Pruning *Tactics to shock old trees into fruiting / hasten their end*
ROOT PRUNING – Dig out a trench around the Drip-line to stress
RING-BARKING – Remove bark around trunk (2 semi-circles)

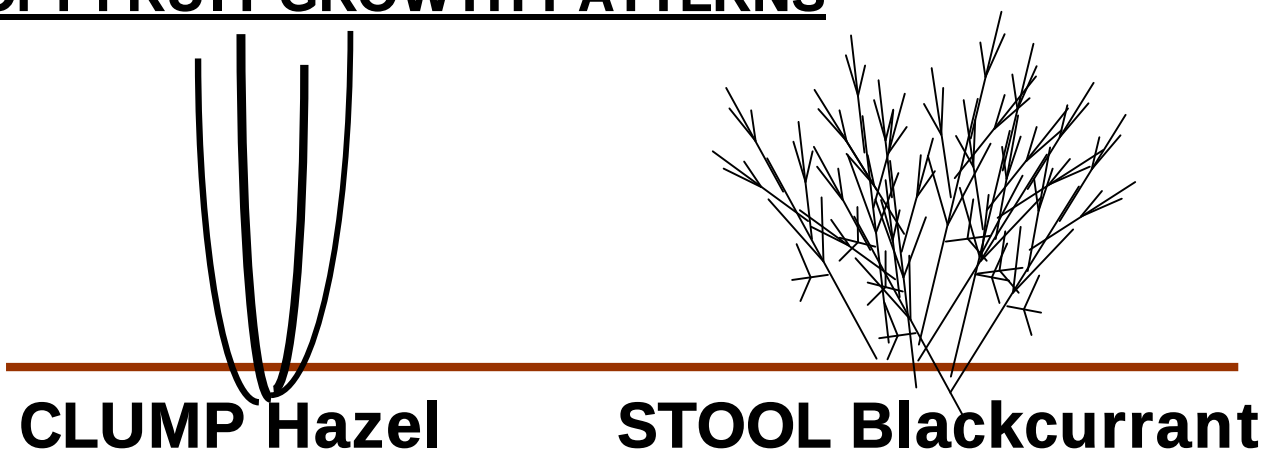
PRUNING FORMS



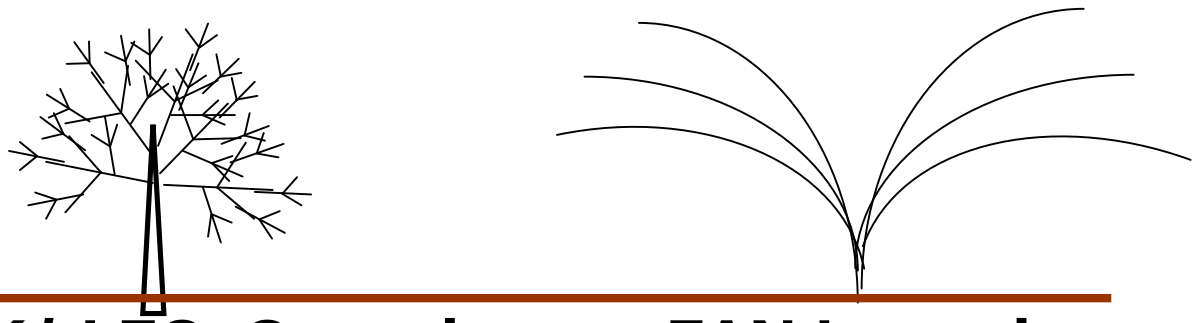
DWARF STEPOVER CORDON

ESPALIER SPINDLEBUSH STANDARD

SOFT FRUIT GROWTH PATTERNS



CLUMP Hazel STOOL Blackcurrant



TRUNK / LEG Gooseberry FAN Loganberry

CROPPING AND HARVESTING

As a grower, you become a **Producer** as well as a Consumer.
Logic dictates the primary importance of **SAVING** on your Personal and Domestic Needs before you have the resources to produce more to become a **Supplier**.

This strategy is insulated from the fluctuations of the Market and is of guaranteed value to you. The unit of currency is the "Belly-full".

By avoiding commercial pressures, you can achieve a continuous supply of diverse, small-scale and high quality produce. As illustrated by seed-saving, which is not only much cheaper but can be far superior to what the market has to offer.

Aim to produce a diverse trickle of food (fresh and stored) throughout the year, rather than a glut in the main season, which may be too much to consume or even process (the classic example is Courgettes).

Try to extend your eating season week by week and month by month until you are producing all year round, eating something you've grown yourself 365 days of the year. This also spread risks and encourages a range of different strategies at different times, rather than relying on a single technique (the right way). Also reduces impact of extreme weather events and patterns, by spreading bets across the whole year.

A Glut can be a processing or distribution challenge. Many crops require machinery, whether bought or hired, and are only economic at a very large scale. This requires Capital Investment and legal structures such as co-operatives. In the case of crop failure, the discontinuity of supply is proportionately worse with scale.

You can achieve Intensive Cropping by thinking ahead and anticipating as many factors as possible.

Scheduling – Predict when one crop will finish and prepare the next crop ready to go in as soon as the first finishes. Use techniques such as staggered sowings, overlapping crops, under-sowings and quick catch crops.

Judge the Weather to harvest at the peak of sweetness and ripening.
Too much rain produces insipid flavour and spoiling due to moulds and rots.
Try to use Windows of opportunity in the weather to achieve critical tasks.

Harvest after Full Moon. We all have a capacity to scan a maturing crop, testing for the point of perfect ripeness by eating. Our primal brains are expert at pattern-recognition when it comes to food. There are hundreds of varieties of all common food plants. Maintaining a diverse range makes our production systems much more adaptable to change.

When preparing produce for others, apply Quality Control by testing (eating) to avoid Aversion (e.g. slugs in salads) and pay some attention to Presentation.

Our bodies have the capacity to store certain nutrients and vitamins, because we have always experienced an annual overdose of some foods.
The more Processing required, the greater the energy input required (e.g. Drying)

Preservation by

Sugar / Alcohol / Vinegar / Salt / Oil / Smoke / Sterile

GROWING AND SAVING SEEDS

Why seeds? **Seeds are a symbol of wealth and renewal.**

They represent hope for the future, resilience, a concentrated store of value.
Remember Jack and the Beanstalk!
Seeds are the most valuable crop we can grow.
If you know a few basics, you can avoid problems like cross-pollination and produce seed that's as good as you can buy.

Why Local? **Biodiversity. Heirloom. Provenance.**

When a seed is grown in a particular area or microclimate over three generations, it adapts genetically to specific local conditions, making it more robust and likely to succeed.

Seeds grown organically have superior **vitality** and **viability**.
An ample supply of home-grown seed will save money and allows you to **distribute** spare seed to others. You can also use a generous supply for **successional** sowings and to broadcast as an edible **green manure**.
Growing for seed tests the quality of your growing conditions and abilities because it requires sufficient fertility and pest / disease control for longer.

- Demonstrates successful achievement of all previous topics / elements
- Self-sufficiency / Biodynamic / local adaptation (survival & selection)
- Concentration of value – seed-bank – what would you take to relocate
- Abundance of nature – e.g. 20,000 Maize in Mexico
- Future potential – exponential increase
- Economic & political engagement – GM – agrochemical monopoly
- Organic superior – ref Steiner Biodynamic story
- Commercial seed – availability – catalogues Legal – EU Reg.s
- Save Heritage/Heirloom varieties rather than commercially available

BOTANY (ref: Categories / Weeds)

Distribution Strategies -
Wind-blown / Insect (bee / fly / moth etc) / Animal (internal / external)

VARIETAL PURITY.
Simple flowers are **self-pollinating** (e.g. Tomato / Legumes).

Promiscuous – maintain isolation / avoid **cross-pollination** with a related cultivar or wild relative (e.g. Brassicas).

Grow enough specimens to retain and maintain the full range of genetic characteristics. For most crops this means at least 12 plants. Corn needs 100.

F ^{1} hybrid varieties (2 separate lines combined for vigour) will produce viable seed, but are more likely to deteriorate long term. F ^{2} latent genes appear.

SPACE Leaving seed crops in the ground may disrupt your rotation, so leave a few plants at the end of a bed. Support tall plants as they flower. Biennials can be left to over-winter in the ground outside. Mulching will feed, maintain weed control and speed up ripening. Start crops which have a need a long growing season EARLY (corn / climbing beans / peppers / aubergine)

BIODYNAMICS Sow and cultivate crops for seed on FRUIT/FIRE days. Harvest mature seed AFTER Full Moon at the completion of growth cycle.

TRANSPLANT specimens either outside to minimise the space they take up - or inside a structure for winter protection and to avoid cross-pollination.

- Growing to maturity – after usual cropping point (e.g. biennials)
- Select specimens and transplant
- Intention – by design or by accident (peas)
- Space over time – Planning - Label AND record on diagram
- Retain genetic diversity of variety = 12 plants minimum

COLLECT when the majority of the seeds are ripe, before they start to fall. Harvest wind-blown seed (e.g. Salsify / Scorzonera) DAILY as they ripen.
Tip: To free up space for next crop, lift the whole plant with its root early, when seeds are nearly mature. Nutrients in the plant's root, leaves and stems will be recycled and diverted into ripening the seed.

PROCESSING
Dry and reduce the volume of seed stuff in progressive, incremental stages.
Whole plant g Seed heads+stems g Seed+chaff g Seed+dirt g Pure seed.
Seeds are very resilient and can withstand vigorous mechanical impact.
Most can be processed by stamping with feet or by pummelling with fists.

CLEANING

1. GRAVITY. Agitate so that seed settles / remove lighter chaff from the top.
2. WINNOWING. Blow the chaff off the seed, shake to settle and repeat.
3. Use a SIEVE to separate dirt, dust, soil which is smaller than seed.
4. FERMENT gel-coated seeds (e.g. Tomato) in water for 2-4 days, rinse & dry.

STORAGE Avoid variations in moisture and temperature.
Store in cool, dry conditions such as an unheated room.
Use paper or card containers which breath (rather than sealed plastic).

STORAGE LIFE
Most seed will remain viable for 3-5 years (level humidity and temperature)
Umbellifers (Apiaciae) and Alliums (Amaryllidaceae) only viable for 1 year
e.g. Root crops, such as Parsnips, carrots and onions.
Fresh – Sweet Cicely / Angelica / Rice
Caution: Saving seed potatoes. Vegetative reproduction allows viruses to build up after 3-5 years. Save some tubers, but buy in some new stock too.

GROWERS' HEALTH CHECK-LIST

TETANUS Lockjaw/ Jaundice

Soil-borne infection Most likely from Deep Cuts. Transmission high from old and rusty metal / animal manures. Cold symptoms for 5-10 days. Nerve endings progressively die.

TREATMENTS: Inoculation renewed every 5-7 years or antidote administered immediately after exposure

WATER-BORNE

WEIL'S Disease Leptospirosis/ Infectious Jaundice

Transmitted by digestion of / subcutaneous contact with water contaminated by Rat, Mouse, Dog Urine

SYMPTOMS: Diahorrea / Aching Extremities / Renal Failure [yellow skin] / high fever [39°C+] developing like Hepatitis / Meningitis

CHOLERA / TYPHOID FEVER

Ingestion of water contaminated by faecal matter

Avoid stagnant water / leachate from contaminant sources

GASTRO-ENTERITIS Digestive infections

Stomach Bugs e.g.Cryptosporidium(SHEEP)

Water Pollution Fluoride /Industrial Effluent /Sewage

ANIMAL TO HUMAN

All Domesticated animals share diseases with Humans e.g. Pig diseases and manure very similar to human

Salmonella handling Poultry manures and by-products Symptoms latent or suppressed in animal

BSE/CJD (Cow) Eating Prion-infected material (Bone)

'AIDS' Virus incapable of survival outside of human body for more than 24 hours

Fungal Infections Candida / Thrush

Over-Exertion Blisters / Piles / Hernia /"Bad Back"

Immune Responses / Hypersensitivity
e.g. Allergies / Hayfever / Asthma / Eczema

Exposure to U-V Radiation e.g. Skin Melanomas

Physical Soil Contaminants e.g. Glass / Metal

Genetic Adaptations Resistant to Biocides / Antibiotics. e.g. Necritising Fasciitis

INSECT BITES e.g. Midges / Ticks (Lime's Disease)

BEE STING (Barbed hook) Knock /scrape off poison sack which continues pumping after bee dead.

SYMPTOMS: blood vessels dilate / swelling / puffy skin / difficulty breathing / senses impaired

Anaphylactic Shock: whole body defence reaction possible in some individuals, for whom consequent stings could be lethal. Test susceptibility.

TREATMENTS: Antidotes / Noradrenaline injections.

WASP STING Poison injection hypodermically

Causes inflammation / irritation Treat with cold water

Short-lived pain [30 minutes] + minor bruising [12 hours]

SNAKE BITE (Adder) Suck venom / Source anti-venom

CARCINOGENS Avoid inhaling spores of Moulds [warm weather] / Bracken [July to August]

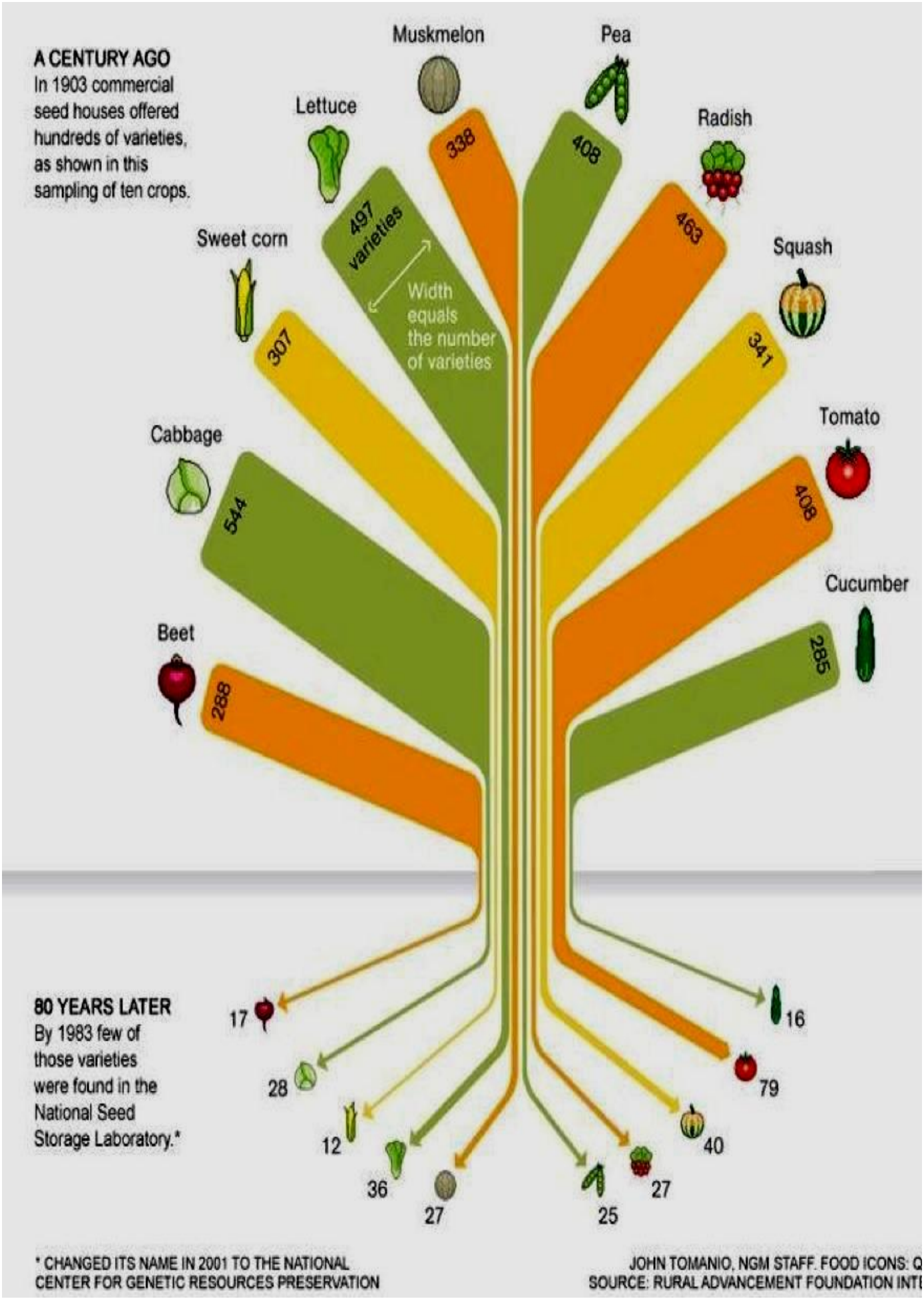
Biocides Asbestos Dust from flaky Blue mineral form

Soil Poisons Mercury / Lead / Chromium / Cadmium
Plants will indicate excesses by symptoms or necrosis.
Dangerous only if large amounts of soil directly ingested.

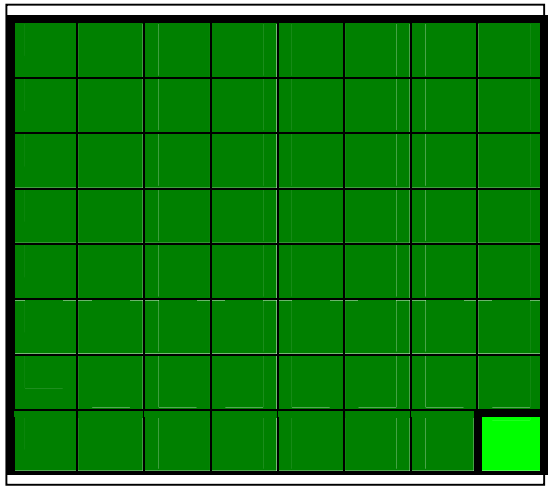
Atmospheric / Airborne Pollution

Vehicle emissions Carbon Monoxide / N Ox / Particulates
10m /30 ft from busy road. Shelter belts / trees / hedging

Incineration Plastic, Tyre and Factory Fires Dioxins


A CENTURY AGO
In 1903 commercial seed houses offered hundreds of varieties, as shown in this sampling of ten crops.
Muskmelon
Pea
Lettuce
Radish
Sweet corn
Squash
Cabbage
Tomato
Beet
Cucumber
497 varieties
Width equals the number of varieties
338
408
463
307
341
544
408
288
285
80 YEARS LATER
By 1983 few of those varieties were found in the National Seed Storage Laboratory.*
17
16
28
79
12
40
36
27
27
25
* CHANGED ITS NAME IN 2001 TO THE NATIONAL CENTER FOR GENETIC RESOURCES PRESERVATION
JOHN TOMANIO, NGM STAFF. FOOD ICONS: Q
SOURCE: RURAL ADVANCEMENT FOUNDATION INT

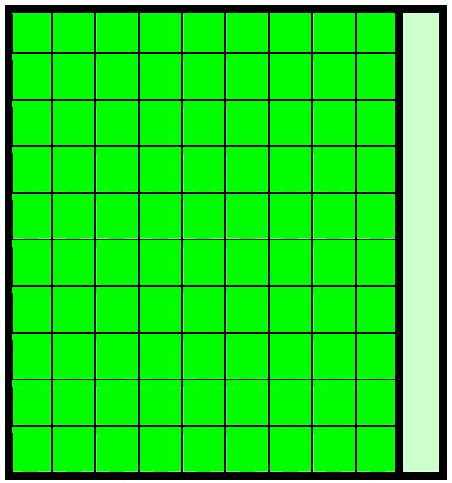
UNIVERSAL GROWING SKILLS *Activity / Element*		1. DO Instructed	2. REPEAT Independent	3.TEACH Demonstrate
PROPAGATE	1. SOWING – INSIDE & OUT			
	2. POTTING - METHODS & GROWTH MEDIA			
	3. CUTTINGS – HARD-/SOFT-WOOD & DIVISION			
SOIL	4. CULTIVATION – PREPARATION & AFTERCARE			
	5. BULKY ORGANIC MATTER & FERTILITY			
	6. PLANTING – ANNUALS & PERENNIALS			
PLANTS	7. CROPCARE PRUNING / TRAINING			
	8. WATERING FEEDING / MULCHING			
	9. PESTS & DISEASES			
HARVEST	10. CROPPING & HARVESTING			
	11. STORAGE & PROCESSING			
	12. SEED – GROWING & SAVING			
EVIDENCE: 1. Self-certified / 2. Witnessed / 3. Audio-Visual / 4. Portfolio				



ONE MILE
= Eight Furlongs

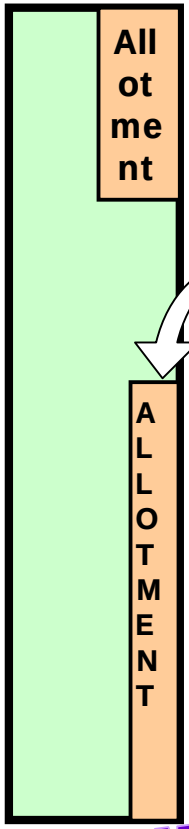
One Square Mile
= 640 Acres

One FURLONG
(Ten ACRES)



= Ten CHAINS

One Acre =
One Furlong
x
One Chain



CHAIN

Rod
Pole
Perch
Lug

One Mile	8 Furlongs	80 Chains	1,760 Yards	5,280 Feet	63,360 Inches
	One Furlong	10 Chains	220 Yards	660 Feet	7920 Inches
		One Chain	22 Yards	66 Feet	100 Links (8 inch per link)
			One Yard	3 Feet	36 Inches
	One ROD / POLE / PERCH / LUG		5 ½ Yards	16½ Feet	198 Inches

One Acre = One Furlong X One Chain = 4840 Yards ^{2} = 13,520 Ft^2

if One Allotment = 1/8 Acre (= 605 Yd^2/1815 Ft^2),

then there are 8 x 10 x 64 = 5,120 Allotment Plots per Square Mile!