

COMMERCIAL PRODUCTION OF HERBS

Aim

Understand how to grow herbs commercially and develop a production plan for a medicinal herb crop.

GROWING REQUIREMENTS FOR THE MEDICINAL HERB MARKET

The way in which medicinal herbs are grown, harvested and dried has a large impact on production as well as (more importantly) the effectiveness of medicinal herbs. Each species has its growing, harvesting and storage requirements. Harvest time differs according to the part of the plant harvested ie. aerial parts, leaves or roots. Harvesting techniques also differ according to species and the requirements of the herbalist or herb distributors in general. At certain times of the growing season, more chemical constituents or oils are present and research needs to be done beforehand into all species that you aim to grow.

It must be remembered that a quality herb will produce a quality medicinal product. Stringent guidelines are set by the distributors of medicinal produce and it is difficult for a new grower to break into this market unless they can prove that they are growing quality herbs that meet each distributor's guidelines.

Growers also need to be aware that the use of mulch on herb beds can contaminate the harvest as it is very easy for small amounts of debris and organic matter to be mixed up with the harvested product. This is unacceptable to both the distributor and herbalist.

It is wise for the home grower to also follow these guidelines to ensure that the herbs they are using are of the highest possible quality.

FOLLOWING ORGANIC PRINCIPLES TO GROW HERBS

There is a vast amount of medicinal herb material on the world market that is:

- Not grown organically,
- Is irradiated to kill bacteria during export to overseas destinations,
- Does not have the vitality that it is fair to expect of a medicinal herb.



Clean, uncontaminated, chemical free, organically grown herbs are sought after by both distributors and herbalists. It makes sense to follow organic practices in the growing of herbs so that the benefits from them are most natural and effective. Herbs grown organically are able to realise their full potential as they are not forced into growth with added artificial fertilisers or blasted with chemicals, which reduces their efficacy and potentially adds to the ills of the recipients, for whom they were grown as a treatment.

MANAGING A MARKET GARDEN

Commercial herb growing is more than just growing healthy crops. If you are to be successful and run a viable operation you must also:

- a. Select the right crops to grow.
- b. Have a workable physical layout
- c. Manage your staff and finances properly.
- d. Market your produce properly.

The most important things you can do before growing and subsequently marketing any new crop is to understand the capabilities of your business:

- The financial resources ie. projected gross profit; financial returns on your investment; cash flow situation; production budgets; potential borrowing capability.
- The operating facilities ie. the production capacity of the land taking into account availability of labour and equipment.
- The production schedules and cultural practices
- Previous production rates.
- The competitive strengths and weaknesses ie. your skills; the status of your farm within the organic industry including recognition of the product, quality of the product; your projected market share; your ability to offer competitive prices; your ability to promote and advertise; the distribution channels you will use.

PRODUCTION PLANNING AND DECIDING WHAT TO GROW

A production plan is designed to prepare for the production of a particular type of process. It might include a statement of what you aim to produce, followed by an analysis of relevant information, and then a determination of decisions, based upon the information analysed. A simpler approach which can sometimes be appropriate might be to simply prepare a production schedule or timetable (ie. a statement of the tasks that need to be undertaken, step by step, in order to produce a particular product.

Flow Charts

Throughout the life of any crop, you will need to do a range of things. It is often helpful to break down the growing period into weeks designating the tasks which are to be undertaken each week. (Obviously the actual time of carrying out any task will vary a little according to changes in the weather and different varieties of plant, etc.)

Example of a Simple Flow Chart

Week 1	Sow seed in 75% sand and 25% peat and place in greenhouse
Week 2	Check for germination. Keep well watered.
Week 3	Check for damping off, thin out if necessary. Take appropriate action if needed
Week 4	Plant seedlings
Week 5	Check for insect attack and use an appropriate control method if required. Feed with appropriate fertiliser (depending on the crop)
Week 6	Check for insect and fungal problems. Remove affected leaves, plants, and/or use an appropriate spray
Week 7	Continue checking for pest and disease and treat with appropriate methods
Week 8	Check for any signs of nutrient deficiencies and adjust feeding program if needed. Continue checking for pest and disease and treat with appropriate
Week 9	Harvest

Obviously some crops involve more work, such as pruning, changing nutrient solutions (in hydroponic growing), shading, temperature control, staking, or your approach to pests and diseases may involve a biological rather than chemical approach. Any such tasks should be included in a flow chart. Analysis of the crop's life in this way will help you plan your production.

Examples of Information to be Collected and Analysed

Climate

When deciding what plants to grow, consider the following:

1. Ease of Propagation/Cost of Transplants

- What will it cost to get your initial plants? (In time or money)
- If you plan to propagate yourself; are they very easy, to propagate, or difficult?
- Are the plants readily available?
- Will you need to source plants from specific growers if you are an 'organic' producer?
- Is the recommended planting time the same as the time of year you plan to start your operation?

2. How easy are these plants to grow?

- Do you (or your staff) have the expertise to grow, harvest and possibly dry these varieties?
- Difficult plants may be more costly to grow, and more risky to get a profit from, unless you have better than average skills.

3. How long will the crop take to grow?

Some plants produce a crop ready to sell within months, others take many years. In medicinal herb growing the majority of the plants grown are perennial. You may be able to harvest two or sometimes even three times a season according to the species. In order to have a diversity of crops that will provide you with the best possible income, annuals can also be grown. Although not as many species of annuals are used for medicinal purposes, there is still a viable market for specific good quality annuals.

4. Suitability to your facilities.

- Do you have the right buildings, equipment and other facilities to grow, harvest store and possibly dry the particular plants under consideration?
- Do you have the money and the space to provide those facilities?

5. Suitability of Climate

- What plants are most suitable to grow in your climate?
- It is always more efficient to work with the environment rather than trying to recreate different environments.

6. Are other competent growers already producing the crop you would prefer to grow?

- Can you establish a share of that market?
- Does the market prefer smaller quantities of each herb?
- Some buyers also require producers to supply small quantities of herbs that have a complimentary medicinal value.

7. Distance from Potential Markets

- Transport is costly, and can be risky. What other alternatives are available?

8. Returns

- Are profits (in addition to wages) likely to be an adequate or reasonable return on your investment in terms of time and money?

9. Your Staff's Skills

- Don't try to do what you are not skilled to do.
- Someone with better skills will probably do it better and cheaper.

Other Factors That Need Consideration

- Information is generally readily available for traditional products grown locally, but those not established with local farms may be more difficult. Often looking to similar climates in other countries where the same product is grown can turn up useful advice.
- Period till harvest/selling of crop/animals
- This varies greatly according to the produce being considered. It can depend on the time of year when production is started (note: demand or growth might slow down in very hot or cold weather)
- Business finances - traditional sources are banks, but there are other options (eg. taking in a partner or buying franchises with extended payments).
- Average value of crop/stock over several years (5 years would be appropriate)
- The seasonal price fluctuations should be obtained if possible from an appropriate authority (eg. from the Dept of Agriculture, A trade organisation). Note: some products are subject to greater than normal price fluctuations.

Examples of Where Decisions which might need to be made

- what will you produce in the future (varieties), quantities (how much), when (production timetable)
- which is preferred cultural technique, which machines are preferred for production
- how best to control pests, diseases, etc
- timing of harvesting, method of harvesting, processing techniques
- mixed row cropping or monoculture
- fencing construction costs

- use, cleaning and maintenance of buildings and equipment eg. servicing of farm machinery
- establishment of markets and buyers
- are different enterprises compatible

Financial Aspects

Liquidity needs to be maintained within any enterprise. Will the production mix and levels support the ongoing operation and sustainability of the farm?

The Scale of Economy

The size of a farming operation can dictate the choice of what is produced. A good example is wheat. The large scale at which wheat is currently produced limits the price per tonne paid, making wheat production for the open market unprofitable for smaller concerns.

The producer, wanting to grow wheat, but cannot do so on a large scale, should investigate markets for something such as organically grown wheat. The effort is larger in producing organically, but so is the return, making it a viable option for smaller wheat growers.

In assessing the scale of economy for production, estimate the amount of production for the area to be used, including the highest and lowest production expected. Then estimate the amount of return expected versus the cost of production expected at these different possible production rates. There will always be a point where the cost of production of each unit i.e. tonne of product starts to rise higher in relation to the return. This may be due to the extra labour costs involved in harvesting a larger crop, the extra costs in terms of irrigation and fertiliser or the sum of all of these extra factors.

Keep in mind that most of the figures you come up with will be subjective. Finding out exactly what a market cost will be at a given time, or what actual level of production you will achieve is virtually impossible. However, this exercise is a valuable decision making tool, allowing the farmer to see what scale of economy can be achieved, and what can be included in the overall production plan, and at what levels.

Materials

Another important point to consider is the longevity of the product you are considering producing, especially in terms of materials. Is the product obscure, requiring sourcing of seed, special fertilisers, etc. from only one or two suppliers, or even overseas? Or is it a commonly produced item, with materials and related supplies being readily available at a competitive price? While being one of a select few producers is ideal, especially if there is a high demand for the product, assessing the ongoing supply availability is important. If you are entering a new area, where suppliers are few, try to investigate the suppliers' reputations and keep aware of how they are doing. Risk brings high return, but a sudden loss of supplier can leave the producer without a product, and in financial trouble.

Equipment

Investment in proper equipment is costly, but very necessary. It is not essential to have the very best and newest of everything, but investment in good, up to date equipment can make the difference to efficient production. Some points to remember are:

Upgrade equipment when necessary - to remain competitive, you must use equipment which will enable you to produce competitively (eg. If your competition is using machines that cut the cost of production significantly and you are not - you may be squeezed out of the market). For see the lifespan of machines/tools and buy according to that lifespan

If a machine is not likely to be out of mode quickly you should buy quality, maintain it well, and sustain the use of a machine for a long time to maximise benefit from that machine. Look at the depreciation value for tax deductions as well.

Contingencies and Seasonal Variations

Planning is a continual part of any business. While pre-planning can help to prevent a lot of unexpected difficulties, there are always things that cannot be foreseen. Nothing ever remains the same in agriculture, especially in regard to seasonal changes. Look at what can be expected and what may be considered "the unexpected". Action plans in these areas will not prevent the event from happening, but it can stop the events from becoming catastrophic.

The Expected

Seasonal variations are a fact of life. Many years of good growing weather may be followed by a few years of drought or heavy rains. This is one of the benefits of choosing to diversify. One product may have average results while others thrive in the changed conditions. The move away from a monoculture will ensure the need to dispose of or undersell excess stock does not have a devastating impact on the producer. With diversified product, a loss in one area will often be offset by a gain in another.

Another consideration is the timing of the produce and its effect on the farm and the farmer. How and when something is produced can affect the soil. For example soil structure will be damaged if worked during wet conditions; crops need to be planted at the optimum time for each species to ensure high yields. It is also of no use to have several different crops, only to find that they are at their peak harvest at the same time of year. Extra help may be needed to harvest the crops, bringing additional cost to the production.

The staggering of planting times and production sees resources being used to their best advantage at all times.

The Unexpected

In any agricultural situation, the unexpected will happen, sooner or later. With good planning based on informed foresight, you can minimise the impact of otherwise potentially disastrous situations. A sustainable approach to farming is a way of minimising the likelihood of problems.

Types of Problems

Drought - lower production rates and higher costs through lack of natural rainfall and higher irrigation demands.

Flood - erosion; crop destruction; structural damage to fences, buildings, roads etc. drowning of domestic and wild animals are all common results of flooding.

Storm - strong winds may damage buildings and fences, blow over crops and windbreaks. Torrential rain may cause erosion and landslides. Hail can strip crops of their foliage.

Plague - pest and disease can wipe out crops

Soil Degradation - caused by many and varied sources (erosion, storms, floods, droughts, vehicular traffic, hoofed animals, removal of vegetation, over-cropping etc.)

Solutions

- Reduce production so as to not overload the property eg less crops per acre
- Diversification of produce avoid monoculture
- Consider alternative types of produce
- Adjustment of production for cyclic crops
- Harvest earlier/later ie. in a cool season, harvest wine grapes later because it takes longer for sugar levels to develop; if a storm is coming, harvest earlier to avoid damage.
- In warm areas consider early cropping fruit trees to avoid fruit fly infestation
- Postpone planting - in harsh weather conditions, postpone till the outlook is better. Delaying planting will also result in later maturing - by having a later crop it may result in gaining a stronger marketplace when other stocks of crops have all depleted
- Better land care - improve carrying capacity of a property (sometimes simply by adding a deficient micronutrient)
- Minimise use of heavy equipment to lessen land damage.

What other Planning do I Need?

Planning is an ongoing thing. Most businesses should prepare, at the minimum, a one year, five year and twenty year plan. Included in the business plan are the planned production rates, estimated costs and expected return. There should also be planned investments, equipment needed and possible new areas to pursue. And as outlined above, plans for un-seasonal weather and catastrophic events.

All plans, though, should be subjective, ever changing and adapting to what is happening in the real world. For instance, many producers who have turned to value added products (ie. making wine from

their grapes) are reaching what they forecasted as 20 year plans being achieved in 5 to 10 years. Without a basic plan to guide and help the business keep their "eye on the ball", changes can mean the end of the business, instead of the break through to the future. Planning is the best way of being as prepared as anyone can be for whatever surprises the future may hold.

STANDARDS

Herb farms, like any business must set and adhere to certain standards if it is going to operate profitably. These standards can be broken down into three main groups:

- a. Cost Efficiency Standards
- b. Quality Standards
- c. Quantity Standards

Cost Efficiency

There must be a sound relationship between cost of production and sales price. Both of these monetary figures must be constantly monitored and maintained at an acceptable level so as to ensure profitability in the business.

$\text{Cost of Production} + \text{Profit} = \text{Sales Price}$

If the cost of production gets too high, then profit will decrease. In such a situation, the sales price must be increased, or else the profit figure can become a minus amount (ie. you might be losing money rather than making money).

In order to control your cost effectiveness, you must make it your business to know (and control) all of those things which influence Cost of Production.

Due to the fact that a lot of herb farming is very labour intensive and there is little in the way of mechanised harvesting cost of production can be high due to the labour costs. For example most small growers of chamomile will still be harvesting the flowers by hand it takes an enormous quantity of flowers to produce a kilo of plant material. A hand held harvesting tool with a small basket attached to catch falling flowers has simplified the process a little.

Once again in some instances if you are producing premium grade material mechanised harvesting machinery may not be suited due to the possibility of contamination from fuel or fumes.

The cost of production is influenced by the following factors:

- cost of site (Lease/rent value)
- cost of site services (power, gas, water, insurance, rates etc)
- cost of materials (soil, pots, fertilizers etc)
- cost of unsold produce - a certain proportion may be lost, may die, or may become unable to sell (some horticultural businesses budget for as much as 30% of stock being thrown away)
- labour costs (be sure to include your own time as well as employees)
- advertising/promotion (printing, advertising in magazines etc)
- selling costs (transportation, Invoicing etc)
- taxation (don't forget payroll tax, income tax, retirement funds etc)

Profit

This figure should be over and above money which you earn as wages. If you are only working for wages (with no profit), then you would be better putting your money into some different form of investment and going to work for someone else.

Profit should be greater than the interest rate which you could get by investing your money elsewhere. Profit should normally be at least 15-20%.

In horticultural businesses the profit margin can vary greatly from crop to crop and year to year. You will find that profit will be very low (possibly nothing) some years, and high other years.

The profit must be viewed in terms of an average over several years.

New operations should always have sufficient liquidity to carry them if they have a couple of bad seasons before some good seasons come along.

Sales Price

The figure which a produce is sold for can vary considerably. This can be due to such factors as overall economic conditions, general availability of the product you are selling, and consumer demand. The price which a crop brings varies greatly from time to time; hence the profitability also can vary. You might make a loss on lettuce one year and a profit the next -essentially you work on the law of averages to overall give you a profit.

Quality Standards

The herb industry like any other works on quality standards, large quantities of inferior quality dried herb material finds its way onto the international market each year. This low quality material is referred to as 'Trade Herbs' and the producers are the largest suppliers to the herbal market. There is no point in the small producer trying to compete with these products. The second largest material to find its way onto the market is the 'Manufacturing Grade' organically grown herbs that are used in the production of tinctures, teas, tablets and so on. Niche markets can be found for high quality, Premium Grade, material grown to organic principles and harvested, dried and packed to the highest industry standards.

Some buyers require the material to be tested, checking the active constituents, volatile oil content as well as for contamination. There is always a market for top quality medicinal herb material and it also attracts the highest prices.

The following factors are of concern when considering produce quality:

- general appearance of vigour or health such as markings or lack of markings on produce (eg. disease, rot, bruising etc)
- taste or smell (eg. how sweet or bitter)
- freshness (ie. the quicker you can sell it after harvest, the better the quality will be considered)
- lack of contamination

Monitoring and Reviewing

In order for a farm to be sustainable in the longer term requires continuous monitoring of its condition. Continually check for the following, and adjust your management and long term plans whenever a problem is identified.

1. Deterioration of Soil

- lowering of organic content
- lowering of E.C. (Electro-conductivity)
- changes in pH
- preliminary signs of erosion
- salinity (white caking on soil surface)
- reduced plant growth

2. Deterioration in water quality

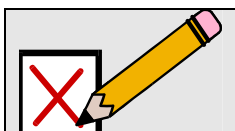
- increased E.C. (Electro-conductivity)
- algal blooms
- clarity or colour changes

3. Appearance of new weeds or pests (or dramatic changes in their populations)

4. Changes in susceptibility of pests or diseases to treatments (ie. this can indicate resistance is developing in new generations of the pest).

5. Deterioration in crop health (eg. increased susceptibility to disease; discolouration of plant foliage, etc.).

6. Deterioration of crop yields



SELF ASSESSMENT

Perform the self assessment test titled 'Self Assessment Test 8.1'
If you answer incorrectly, review the notes and try the test again.

CROP SCHEDULES

It is important for any producer to devise crop schedules for the produce that is grown. Not only will a schedule give you valuable information for the following year's crop, it will also define the steps you need to take in order to successfully produce a quality product.

Firstly you will need to determine how you are going to grow your crops ie. the methods you will employ. This may be restricted to, for example, organic practices as much of the medicinal herb market insists on clean, chemical free produce that is uncontaminated. Contamination may not necessarily only come from chemicals or through the use of artificial fertilisers but can also occur during harvest time when weeds or mulch residue may be included with the crop material. Should contamination occur your crop will most likely be rejected at market.

You may be restricted in the 'organic' products you use to improve your soils ie. 'certified organic' producers need to strictly follow organic guidelines set out by the certification body. There may be restrictions on where you source animal manures, the type of liming agent and even the irrigation water you use. You may also need to investigate the possibility of contamination through spray drift from neighbouring properties.

Long before you are ready to sow your first crop you will have researched industry requirements, your potential market and the cultural requirements of the crops that you want to grow.

Crop scheduling is part of the production plan and includes:

- testing soil pH to ensure suitability for the crops you are growing
- adjusting soil pH
- adding suitable compost/animal manures and other fertilisers
- ensuring that you have a suitable irrigation system
- setting up an irrigation schedule
- setting up a fertiliser program
- setting up a suitable pest and diseases program
- recording all information for each step taken and the materials that you have used
- harvest dates
- harvest quantities

Producers need to also stagger crop plantings in order to maintain a steady supply and prolong the harvest season. This can be achieved to some extent by planting varieties that require slightly different temperatures for optimum growth. For example a producer may successively plant peas from late winter through to early spring and again in autumn by choosing appropriate cultivars. Some cultivars perform better in cool weather others are bred to perform best in warmer conditions. Cultivars can also be chosen according to the amount of time they take to reach maturity, this is another way of extending the cropping season.

It is important for producers farming in cool climates to be aware of the first and last frost dates in their district and also the optimum soil temperature for germination and/or seedling establishment. A production schedule can then be introduced accordingly.

Throughout the life of any crop, you will need to do a range of things. It is helpful to break down the growing period into weeks designating the tasks which are to be undertaken each week. (Obviously the actual time of carrying out any task will vary a little according to changes in the weather and different varieties of plant etc.)

FARMING MEDICINAL HERBS

Some herbs can be damaged by extreme conditions such as heat/sun in summer and cold in winter. Most herbs, however, are fairly hardy.

Herbs which might cause some problem in extreme cold or severe frosts might include:

- *Anthemis nobilis*
- *Artemisia dracunculus*
- *Lavandula officinalis* (some varieties are a problem others not)
- *Marjorana hortensi*
- *Mentha pulegium*
- *Petroselinium crispum*
- *Rosmarinus officinalis*
- *Salvia officinalis*
- *Salvia sclarea*
- *Thymus vulgaris*

Herbs which are extremely hardy to cold include:

- *Allium sativum*
- *Chrysanthemum balsamita*
- *Hyssopus officinalis*
- *Melissa officinalis*
- *Mentha arvensi*,
- *Mentha aquatica* var. *crispa* *Mentha gentilis*, *Mentha piperita*, *Mentha rotundifolia*, *Mentha spicata*,
- *Ruta graveolens*
- *Tanacetum vulgare*
- *Thymus serpyllum*

Large Area Cultivation

1. Often young herb plants need protection when first planted
2. Immediately after planting; water in (ensuring root zone is thoroughly wet)
3. Then sprinkle light organic mulch (eg. compost) around the base to help minimize water loss from the soil. Be sure that the plants you are growing will not be of the type that could potentially be contaminated with the mulch during the harvesting process.
4. Watering should be frequent and light (perhaps twice daily) until plants begin to grow.
5. Afternoon planting is best for seedlings to be planted in open ground - never plant in the middle of a hot day.
6. Soil conditions of many herbs are commonly harsh in nature and to some extent the same conditions need to be reproduced by the farmer (certainly once the young plants have taken hold). The aromatic oils in the foliage generally are stronger if the herbs are grown in full sun and soil which is on the dry side (though there are exceptions).

TRADITIONAL PLANT ROW SPACINGS

Herb	Between plants in Rows (in inches)	Between Rows (inches)
Celeriac	4-6	24-36
Chervil	6-10	12-18
Chicory	4-10	18-24
Chives	12-18	24-36
Dandelion	3-6	14-24
Fennel	4-12	24-42
Garlic	1-3	12-24
Horseradish	12-18	30-36
Onion	1-4	16-24
Parsley	4-12	12-36
Pepper	12-24	18-36
Shallot	4-8	36-48
Sorrel	0.5-1	12-18

STORAGE OF PLANT PARTS USED FOR VEGETATIVE PROPAGATION

Plant Part	Storage Temperature(F)	%Relative Humidity	Comments
Garlic bulbs	50	50-65	Fumigate for mites, hot water treat (120oF for 20mins) for nematodes
Horseradish shoots	32	85-90	

EXPECTED YIELDS OF SELECTED HERBS	
HERB	YEILD PER ACRE (estimate)
Chamomile (Flowers)	0.8 ton
Comfrey (Leaves)	5 tons
Comfrey (roots)	0.8 ton
Dandelion (roots)	1.5 ton
Dill (foliage)	1.5 ton
Fennel (seeds)	1 ton
Garlic	0.7 tons
Lemon Balm (foliage)	3 tons
Marjoram	2 tons
Mint (Peppermint -leaves)	0.8 ton
Mint (Spearmint -leaves)	1.2 tons
Mint (Apple)	2.8 ton
Mint (Winter)	3 tons
Oregano (foliage)	2 tons
Parsley (foliage)	1.5 tons
Raspberry (Leaves)	2 tons
Rosemary (Leaves)	1 ton
Sage (Leaves)	1.5 tons
Savoury (foliage)	1.5 tons
Strawberry (leaves)	1 ton
Tarragon (leaves)	1.4 tons
Thyme (leaves)	1 ton

Note: yields per acre are estimated figures based on information from USA dept of Agriculture, and a variety of opinions, magazine articles, and books from international sources.

PRODUCTION REQUIREMENTS OF SELECTED SPECIES

Roman Chamomile (*Anthemis nobilis*)

Propagation is easy by seed (at 55 to 65 degrees F.), but there is a problem - double flowers are much preferred, and plants grown by seed can often produce only single flowers. Commercial plantings should be made from plants propagated by division. (You can get up to 40 "plantlets" from one double flowering plant -if grown in optimum conditions.

A stock bed may be established to provide young plantlets for field planting. Good soil can be spread around each plant in autumn to encourage it to spread and hence provide more plantlets.

Plant out in September in rows 0.8 metres apart with 0.4 metres between plants.

Every third or fourth year, the area should be planted to peas or perhaps a grain crop and rested from chamomile for a season.

The flowers are the only commercially useful part of the plant

1. Dried flowers are sold for chamomile tea.
2. Oil extracted is used in cosmetics, liqueurs and perfumes. Chamomile oil is in higher demand (world wide) than peppermint oil.
3. Chamomile is one of the top five commercial herb crops in the USA.
4. Chamomile is grown commercially in Germany, Hungary, Egypt, Bulgaria, Yugoslavia, Turkey, Russia, USA and Albania
5. The oil is used in many products including - bath oils, cosmetics, hair dyes, mouth washes, shampoos, sun screens, creams, detergents, perfumes, soaps, medicines (treating skin complaints and wounds, antiseptics etc.

Dandelion (*Taraxacum officinale*) Asteraceae

Growing Conditions:

Easily grown in temperate regions, the plant performs best in a rich, deep, stone-free soil in full sun.

Nutrient Requirements:

A rich organic soil, using well composted animal manures is best for the plant, although Dandelion can become a weed problem, and will grow in poorer soils.

Planting:

The plant can be grown from seed in the spring. Flower heads should be removed before going to seed.

Harvest:

All parts of the Dandelion can be used. Young leaves and flowers are ideal for salads, or the leaves can be boiled or steamed. The flowers are an ideal source of food for bees.

Roots are highly valued and used fresh or dried, lasting up to 12 months. A two year old root is preferable, due to better size and quantity.

Problems:

As stated above, Dandelion can become a very serious weed problem if not handled properly. Flower heads must always be removed prior to going to seed, as they are easily dispersed by wind. This is especially important if leaving the plants in ground for a second season's growth; very hardy in respect to insect and disease damage.

Mint (common) (*Mentha cordifolia*) Lamiaceae

Growing conditions:

Moist fertile soils in filtered sun; extreme heat and humidity will stress the plant

Nutrient requirement:

Maintain a highly organic soil content by mulching well before planting and top dressing when possible early in the season. Apply fertilisers such as fish emulsion, blood and bone or chicken manure pellets.

Planting:

Plant a small division in a mulched soil and water in. Mint will spread prolifically if well watered

Special cultural techniques:

- clip the plant regularly to promote healthy vigorous growth
- in cold districts the plant may die down in winter but will re-shoot in spring
- in warm districts it remains in active growth

Harvesting:

Harvest leaves when required throughout the year.

Problems:

The main problems are rust disease, grasshoppers, snails, caterpillars and water stress.

Varieties: Other types of mint (such as spearmint, peppermint, water mint) are also used as herbs and vegetables.

Horseradish (*Armoracia rusticana*) Brassicaceae

Growing Conditions:

This deep rooting perennial grows best in temperate to cool climates.

Reaching up to 1 metre in height with tufted leaves and small white panicle flowers, the plant likes a deep rich soil.

Nutrient Requirements:

The horseradish plant has its most rapid growth phase at the end of the growing season (to store food for the winter), so a slow release fertiliser would suit the plant best.

A high phosphorous fertiliser is preferable, as the root is the part of the plant that will be used.

Planting:

Root cuttings can be used to establish the plant. Side shoots of harvested bulbs can be used for cuttings and should be stored in a cool damp spot, preferably packed in sand, prior to planting out in spring. Root pieces should be planted to a depth of around 100mm. Non-harvested plants can also be left in the ground to continue growing for the next season.

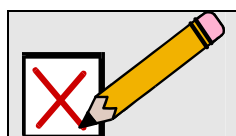
Harvest:

Horseradish roots can be dug in the autumn, or can be left in ground to over-winter. The roots should be cleaned and stored in a cool, dry place. They will last up to 12 months.

Problems

In cooler areas, horseradish can become a very serious weed problem.

It is important to dig deeply and ensure that all roots are dug out when harvesting.



SELF ASSESSMENT

Perform the self assessment test titled 'Self Assessment Test 8.2'

If you answer incorrectly, review the notes and try the test again.



ASSIGNMENT

Download and do the assignment called 'Lesson 8 Assignment'.