

A lush garden scene with various plants, including purple flowers in the foreground and green foliage in the background. The text is overlaid on the upper portion of the image.

The Herb Garden at Penn State Student Farm Proposal

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Growing Conditions

Well-drained

Hagerstown silt-loam is acceptable

Range from sun to shade

Avoid over-watering and over-fertilizing

Garden Layout

Several raised beds (6'x3'x8")

Estimated \$500 each

One plant species per bed, multiple cultivars if needed

Each bed: 60% topsoil, 30% compost, and 10% soilless medium

Each bed holding 0.5 cu yds.

Topsoil: 3-4 cu yds., \$80

Compost: Free, PSU

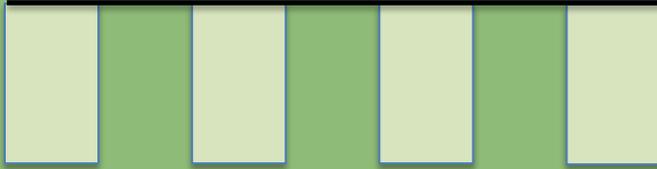
Soilless medium: 2.3 cu yd. bail., \$30



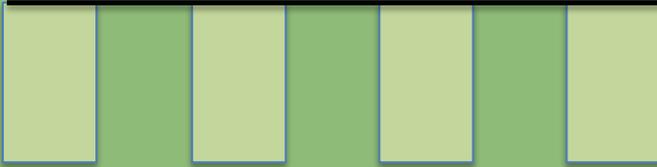
TREE LINE

Rocky Top In

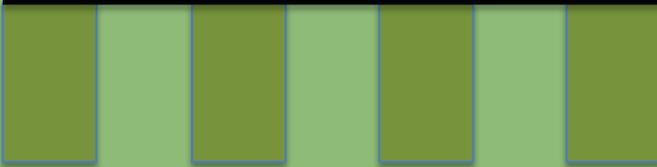
Zone1



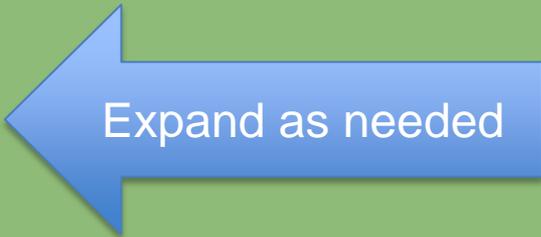
Zone2



Zone3



Expand as needed



High Tunnel

Cuttings

Phase 1

Start some herbs by seed
before last frost

1 high tunnel 20'x48'

Direct sow requirement

(\$1,200)

Grow some annual herbs
in pots, season
extension

Phase 2

2 high tunnels, total

20'x48' (\$1,200)

Closed December-
February



Tyson Greenhouse

Phase 1

Overwinter tea bush in containers

Grow some annual herbs for year-round production and protection of tender/marginal herbs

Phase 2

Hydroponic herb production, ebb-and-flow system

- Quicker harvest, better flavor, more aromatic oils
- High N:K for vegetative growth
- Low EC and slightly acidic
- Metal halide crop lights
- HAF for circulation



Micro-grow System

Serve function of

- Monitor internal temperature
- Select irrigation, drip
- Log outdoor conditions

Cost \$2,000



Garden Maintenance and Upkeep

PSU student volunteers or internship program (seasonal, 1 year)

3 students spring-fall needed
~10hours/week (each)

1 student during the winter for 5hrs/wk

Tasks: planting, weeding, watering, pruning, scouting for pests and diseases, and harvesting and processing herbs

Propagation

Stems, tips work best

Cuttings taken from new growth, early spring/summer

Containers with rooting media

3-5" cutting taken in morning

Containers in greenhouse

Moderate moisture, provide ventilation



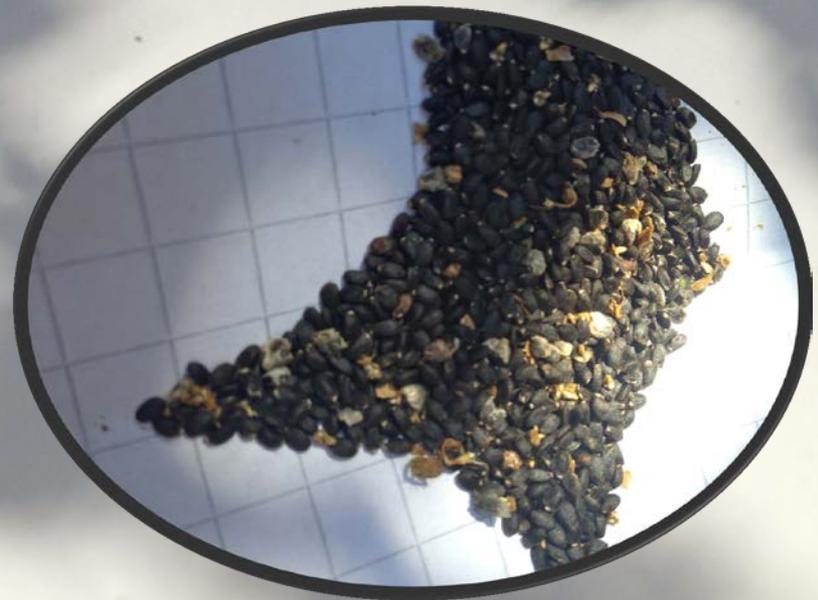
Seed Propagation

Seed germination

Direct sow: sown in the soil after last frost

Transplant: sown in greenhouse during early spring, hardening off before transplant

Order transplant or small potted plants, tea and hard-to-propagate plants



Herb Selection

Current Market

Lavender

Peppermint

Rosemary

Sage

Tarragon

Thyme

Future Market

Tea

Chamomile

Echinacea

Hibiscus

Lemon balm



LAVENDER (Lavandula)



Seeds unpredictable,
cuttings from 1 year
growth best

Zones 5a-9b

Occasional mealybugs,
whitefly, scale, and
spider mite

* Oil used in massage
therapy to relax muscle



<http://hdwaly.com/lavender-flower-images-6-hd-wallpaper.html>

http://en.wikipedia.org/wiki/Lavandula#mediaviewer/File:Single_lavendar_flower02.jpg

<http://lingeriesoapcompany.com/product/lavender/>

PEPPERMINT (*Mentha piperita*)

Zones 3^a-7b

Container-grow from cuttings

Moist soil, moderate sunlight

Pinching required for greater yields

> Mealybug, whitefly, aphid, and spider mites, susceptible to rust

Health benefits...

Oil (IBS), Tea

<http://oldworldgardenfarms.com/2013/03/26/growing-herbs-great-for-your-garden-and-your-kitchen/#prettyPhoto>



<http://mandalasuperfoods.com/?product=peppermint-honey-chocolate-per1oz>
<http://theida.com/ew/wp-content/uploads/2011/11/Image-14.21-Peppermint.jpg>

ROSEMARY (*Rosmarinus officinalis*)

Dry, well-drained, slightly alkaline soil

Easily propagated via cuttings

Zones 7a-10b

Whitefly, scale,
mealybug, and
powdery mildew



<http://topfoodfacts.com/23-fun-facts-about-rosemary-plants/>

http://en.wikipedia.org/wiki/Rosemary#mediaviewer/File:Rosmarinus_officinalis133095382.jpg

SAGE (*Salvia officinalis*)

Requires high available N

Started in greenhouse or via cuttings

Tolerant of many soils

Zones 4a-11

Whitefly, spider
mite, mealybug,
and powdery
mildew



TARRAGON (*Artemisia dracunculus*)

Propagation via root division

Zones 4a-8b

Minimal pests and diseases, occasional whitefly and spider mite



THYME (*Thymus*)

Start seed early spring for optimal growth,
can seed directly outdoors

Propagated by tip cutting or crown division

Zones 4a-8b

Minimal pests
and diseases,
occasionally
whitefly
and spidermite



http://en.wikipedia.org/wiki/Thyme#mediaviewer/File:Variegated_Lemon_Thyme_Thymus_citriodorus_variegata_Leaves_3264px.JPG

<https://roundrockgarden.wordpress.com/page/12/>

<http://t-thyme.com/>

Tea bush (*Camellia sinensis*)

Zones 8-10

Full Sun

4-6' tall, wide

- Grown on farm during summer, overwinter in greenhouse
- Order several 4" pots at \$14.95 each from Burpee during phase 1, multiply gradually with cuttings

Greenhouse pests (whitefly, aphid, scale)

* Healing antioxidants (polyphenols)



<https://camellia-sinensis.com/carnet/wp-content/uploads/2008/04/feuille-s-mao-feng-gp.JPG>
http://www.plantsystematics.org/imgs/chardy/r/Theaceae_Camellia_sinensis_23573.html
<http://www.orchids-flowers.com/tropical-flowers/tea-flower-camellia-sinensis/>

CHAMOMILE (*Matricaria chamomilla*)

Direct sow in spring or fall (light requirement for germination)

Annual

Minimal pest and diseases, occasional aphids and mealybugs

*Wounds, vapor for colds, restlessness relief



<http://hdwallsource.com/pretty-chamomile-wallpaper-20234.html>
http://en.wikipedia.org/wiki/File:Chamomile@original_size.jpg
<https://whispersoftheearth.files.wordpress.com/2012/02/german-chamomile.jpg>

Echinacea (*Echinacea purpurea*)

Zones 3-8

Full sun, part shade

Tolerant; well-drained soil

Clump division, self-seeding

Japanese beetle

*Cold symptoms, bruises,
immune boost



Hibiscus (*Hibiscus sabdariffa*)

Temperate annual

Fertile, sandy-loam soil

Seed propagation or cuttings



Root-knot nematode,
mealybugs, aphids, scale

<http://www.tyrantfarms.com/wp-content/uploads/2013/09/edible-hibiscus-flower.jpg>

<http://www.daganghalal.com/herbagus/ECMPProductDetails.aspx?intProductID=9920>

LEMON BALM (*Melissa officinalis*)

Start from seed 6-8 weeks before last frost

Even moisture

Zones 4a-9b

>Whitefly, spider mites, thrips,
and powdery mildew

*Anxiety, stress, insomnia

* Nervous sleeping disorders



Harvest

Herbs harvested weekly, during early morning to maintain quality

Cut herbs stored fresh, not washed until ready for use/sale

Dried Herbs: high tunnel

Tarragon, lemon balm, and mint (high moisture > oven dried)



Course Offering, “Herbal Crop Production”

Class similar to Small Fruit Culture, Deciduous Tree Fruits, and Vegetable Crops

Science, art, and techniques of herb gardening, processing, and value-addition in conjunction with physiological processes and problems related to commercial production

Education

Attracts beneficial insects

Quantified by student scouts

Importance of medicinal plants (16th and 17th c.)

Drought resistance, xeriscaping



Marketing

Intended market

Campus dining halls, Nittany Lion Inn, farmers market, CSA, specialized independent retailer (oils, mixes)

Phase 1

Dried herbs (plastic jars)

Fresh herbs (containers, low temperatures and high humidity)

Value-added products

Phase 2

4" potted herbs for sale



Value Addition, Market Retail Value

\$6.49/8 fl. oz. bottle of herb/ garlic olive oil

Fresh herbs \$3-5/ ½-1 oz.

\$4.29 16ct. Boxed, bagged tea



Literature Cited

<http://www.microgrow.com/controllers.php>

<http://extension.psu.edu/plants/gardening/fact-sheets/herbs/growing-herbs-outdoors>

<http://www.bgci.org/resources/history/>

<http://www.gardeners.com/how-to/soil-calculator/7558.html>

http://www.moongrow.com/vegetable_planting_guide/herbs/herb%20harvest%20and%20storage.html

http://sk8es4mc2l.search.serialssolutions.com/?ctx_ver=Z39.88-2004&ctx_enc=info%3Aofi%2Fenc%3AUTF-8&rft_id=info:sid/summon.serialssolutions.com&rft_val_fmt=info:ofi/fmt:mtx:journal&rft.genre=article&rft.atitle=Peppermint+oil+%28Mintoil+%C2%AE%29+in+the+treatment+of+irritable+bowel+syndrome%3A+A+prospective+double+blind+placebo-controlled+randomized+trial&rft.jtitle=Digestive+and+Liver+Disease&rft.au=Cappello%2C+G&rft.au=Spezzaferro%2C+M&rft.au=Grossi%2C+L&rft.au=Manzoli%2C+L&rft.date=2007&rft.pub=Elsevier+Ltd&rft.issn=1590-8658&rft.eissn=1878-3562&rft.volume=39&rft.issue=6&rft.spage=530&rft.epage=536&rft_id=info:doi/10.1016%2Fj.dld.2007.02.006&rft.externalDocID=doi_10_1016_j_dld_2007_02_006¶mdict=en-US

<http://www.herbwisdom.com/>

<http://www.rootsimple.com/2010/10/propagating-herbs-via-cuttings/>

<http://www.burpee.com/1/1/1441-camellia-sinensis-tea-shrubs-perennials-1-plant-10668.html>

<http://www.ncbi.nlm.nih.gov/pubmed/19712651>