Designing Polycultures for the Garden

Author: Steve Gabriel

This presentation was originally created for use in the fall of 2013 for the Cornell Garden-Based Learning Regional Training for Cornell Cooperative Extension educators and Master Gardener Volunteers. This training kicked off our CCE 2014 Growing Season Educational Campaign: Designing for Garden Ecosystems.

Garden design is critical for setting the stage for garden success and environmental stewardship. In this training we consider a polycultures approach to garden design. The concept embraces growing multiple crops in the same space, in imitation of the diversity of natural ecosystems.

gardening.cornell.edu
Polyculture: a community of *multifunctional* plants, animals, and fungi that is designed for *functional interconnection*
The many parts of multi-functionality

<table>
<thead>
<tr>
<th>Human Needs</th>
<th>Ecosystem Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Nitrogen Fixation</td>
</tr>
<tr>
<td>Fuel</td>
<td>Nutrient Accumulators/Fertility</td>
</tr>
<tr>
<td>Fodder (for animals)</td>
<td>Living Mulch/Ground Cover</td>
</tr>
<tr>
<td>Medicine</td>
<td>Insectary</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>Nectary/Pollen</td>
</tr>
</tbody>
</table>
Functional Interconnection

YARROW attracts LACEWING protects BRASSICAS
Patterns of the Aster or Sunflower Family

Plants of the Aster family are "composites" of many small flowers in a disk-like flowerhead.

Asters are often easy to recognize from a distance.

Even the "petals" are individual flowers.

Each seed is produced by a single tiny flower.

A Typical Disk Flower
- stigmas
- 5 stamens fused around pistil
- 5 petals fused together
- pappus hair (sepals)
- ovary

Arnica

Dandelion

multiple layers of bracts are common
Botany in a Day
The Patterns Method of Plant Identification
Thomas J. Elpel
An Herbal Field Guide to Plant Families of North America

50,000+ copies sold!
Umbelliferae family

Wild Carrot, Dill, Cow Parsnip, Sweet Cicily, Water Celery...
Mint (Lamiaceae) family
(Anise hyssop, horehound, self heal, all mints)
What about companion planting?

Unfortunately, much of the popular literature that discusses companion planting is based upon some very bad science, in particular, the "sensitive crystallization method" which was originated by Dr. Ehrenfried E. Pfeiffer in the 1930's. ....Thus, the notion that "carrots love tomatoes" but "beans dislike fennel" is based upon an analytical laboratory procedure and not on direct observation of the plants in nature...

www.gardening.cornell.edu/companionplants
Polyculture from Nature

Douglas Fir
Mycorrhizal Fungi
N Flying Squirrel
Spotted Owl

"Pill of Symbiosis"

www.chrismaser.com/truffle.htm -- The Redesigned Forest
Polyculture from Human History

Figure 4

The 4\textsuperscript{th} sister?

- young leaves, flowers, and seed pods of bee plant are edible, and native people boiled and ate them, or made a paste from the plant for later use.

- accumulates iron, and thus is the source of a deep-hued paint used to create the characteristic black designs on Anasazi pottery.

- songs and blessings of New Mexico’s Tewa people mention corn, beans, squash, and bee plant,
The Three Sisters
Exploring an Iroquois Garden

Marcia Eames-Shenly
Turning Problems into Opportunities

Walnut
Juglans spp.
Paw Paw
Asiminia tribola
Elderberry
Sambucus canadensis
Sunchoke
Helianthus tuberosus
Allium spp.
White Clover
*Trifolium repens*
Wine Cap
Stropharia rugosa annulata
Orchard Polyculture

1. Honey Crisp
2. Alpine Strawberry
3. Wild Indigo
4. Daffodil
5. Optional Comfrey

Apple Tree Mature Canopy 10-12 yr

© Daniel Halsey 2009
More complex...
Apple/Peach, Asparagus, Clover, and Turkeys at Good Life Farm
MOFGA Fairgrounds, Unity, ME

Or simpler...

Alley Cropping:

Fruit trees & annuals
Or even simpler…
Some polycultures from Cornell Students:

• Smoothie Polyculture
  (Hazelnuts, Paw Paw, Berries, Mint, Spinach)

• Tye-Dye Polyculture
  (Walnut, Sumac, Elderberry, Calendula)

• Viticulture Polyculture
  (Grapes, Oak, Ducks, Elderberry)

• Compost Toilet Polyculture
  (Bamboo, Lavender, Mullein, Mints)
POLYCULTURE NAME

GROUP MEMBER NAMES

3 - 5 GOALS

TO SCALE SKETCH

1 BLOCK =
1 ft or 5 ft or 10 ft

Arrange cards and describe connections between plants (start with 3 to 5 plants!)
Paw Paw Paradise

1. Support Paw Paw crop
2. Get food yields in first year
3. Foraging habitat for ducks

Paw Paw
Asimina triloba
Understory, shade tolerant tree. Need at least two for pollination. Largest tree fruit that can be grown in NY. Nutritious and delicious.

Sunchoke
Helianthus tuberosus
Tall growing woody herbaceous plant. High yields of high protein edible tubers. Easy to grow, will be permanent where you plant!

Comfrey
Symphytum uplandicum
Herbaceous. Accumulates K, P, Ca, Cu, Fe, Mg, "chop a drop", spider plant, Hybrid varieties have sterile seed (x uplandicum)

Alder
Alnus spp.
Overstory or understory tree that tolerates range of soils, likes moisture. Nitrogen fixing and good wood & wildlife value. Naturalized.

1 block = 10 feet
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