

## Permaculture Principles in Small-Scale Vegetable Production

Great Plains Vegetable Growers Conference, 2010



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### Workshop Outline:

1. A few Introductory Questions & Answers
2. Important Principles of PC Design
3. PC Design at Vajra Farm
4. PC Potential at KC Community Farm
5. "Obstacles" to PC in Commercial Vegetable Production
6. Discussion
7. If time permits, portions or all of "Farming With Nature" will be screened.



### What is Permaculture (PC)?

PC is a sustainable design system stressing the harmonious interrelationships of humans, plants, animals and the Earth.  
(from Lee Barnes—former editor of *Permaculture Connections*)

The term "permaculture" was coined by Australian ecologist Bill Mollison and his student David Holmgren.

PC has been practiced around the world for thousands of years without being so named.



### How does PC differ from organic agriculture?

Due to the inherent sustainability of perennial cropping systems, permaculture places a heavy emphasis on tree crops. Systems that integrate annual and perennial crops—such as alley cropping and agroforestry—take advantage of the "edge effect," increase biological diversity, and offer other characteristics missing in monoculture systems. Thus, multi-cropping systems that blend woody perennials and annuals hold promise as viable techniques for large-scale farming. Ecological methods of production for any specific crop or farming system (e.g. soil building practices, biological pest control, composting) are central to permaculture as well as to sustainable agriculture in general.

(from ATTRA's "Intro to Permaculture: Concepts and Resources")



### What is a food forest?

In a food forest, plants producing edible yields are combined according to the principles of forest ecosystems. Fruit trees, bushes, shrubs, herbs and vegetables are grown in harmonious relationships, each exploiting a different niche (layer) and producing benefits for the whole.



Food forest at the Central Rocky Mountain Permaculture Institute (CRMPI)



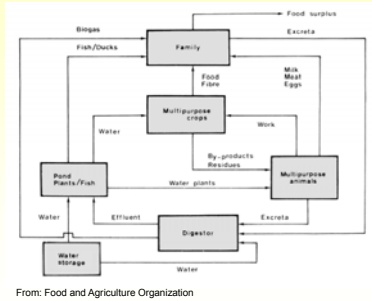
### Can PC work for commercial farmers right now?



Absolutely! PC is about moving in a direction, not arriving at particular outcome.



If you are a farmer, you are a systems designer!

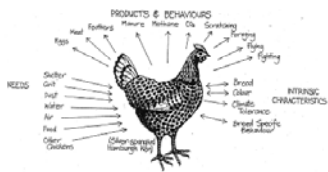
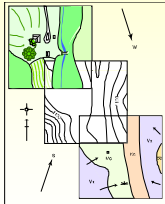


From: Food and Agriculture Organization



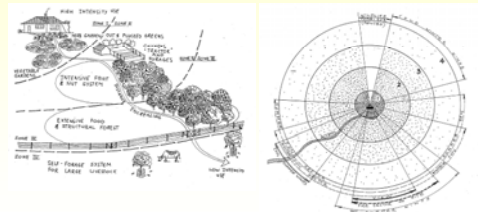
Principles of PC Design

- Develop the right attitude: process-oriented work, "the problem is the solution", ethic of care
- Read the landscape, inventory & analyze farm system components



Principles of PC Design

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- Zone and sector analysis

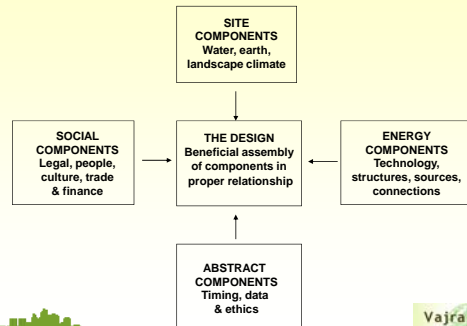


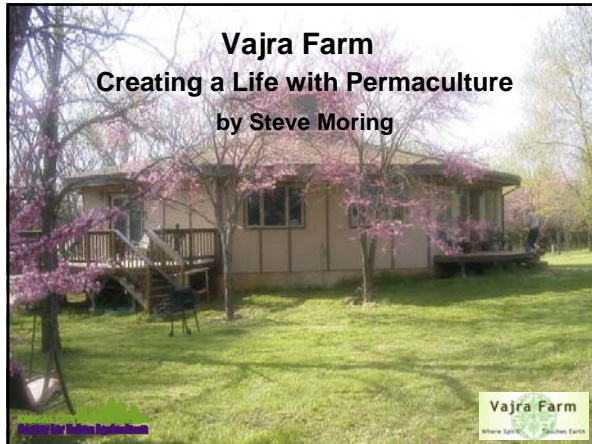
Principles of PC Design

- Develop the right attitude: process-oriented work, "the problem is the solution", ethic of care
- Read the landscape, inventory & analyze components
- Zone and sector analysis
- Placing design elements in relationship with each other in a way that,
  - each element has more than one function (efficiency)
  - each function is served by several elements (redundancy)
  - (a) & (b) together result in resilience
  - natural patterns are replicated
  - biological resources are utilized
  - materials, energy & resources cycle through the system
  - plant diversity and edges are maximized
  - elements are stacked through time and space



Permaculture Design





### Goals for Vajra Farm

- **Restore the land to a natural state**
  - Forest management
  - Prairie restoration
  - Create a botanical sanctuary
- **Establish a sustainable farm enterprise**
  - Grow medicinal herbs & organic food
  - Passive solar home
  - Teach permaculture & organic farming
- **Implement Permaculture ethic and practice**
  - Permaculture designs and projects
  - Energy efficiency, solar, wind & hydroelectric

### Land Assessment

- Acreage & topography
- Water resources – creek, ponds, spring, or water catchment
- Solar access & temperature
- Wind breaks, air flow & elevation
- Shade & moisture - Woodland buffer zones
- Biotic associations

### Farm Layout

Vegetation Map

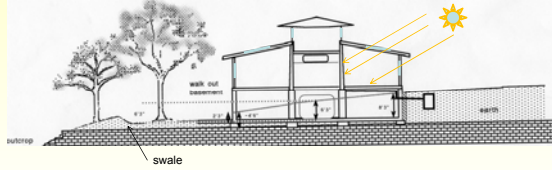
Topographic Map

### Garden & Vineyard Soil Types

<ul style="list-style-type: none"> <li>• <b>Sibleyville</b> – silt clay loam - weathered loamy shale &amp; sandstone</li> <li>• Well drained, moderate water capacity, fertility &amp; permeability</li> <li>• pH 6.5 – 7.0, CEC – 10, 1.5 % Org</li> <li>• Low in S, very low in Zn, Cu &amp; B</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Oska</b> - silt clay Loam – weathered limestone &amp; shale (higher clay content)</li> <li>• Well drained, moderate-high water capacity, high fertility &amp; slow permeability</li> <li>• pH 6.0 – 6.5, CEC – 9, 1.1 % Org</li> </ul>
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### Site Hydrogeology

## Trapping Energy Passive Solar Aspect



## Sector Analysis

Prevailing Winter Winds

Prevailing Spring & Summer Winds



Water Flow



## Field & Woodland Biotic Associations

### •Old field grass & weedy annuals & perennials

Dominant grass species: Brome, Fescue, Little Bluestem, etc.

Ephemeral species: Aster, Goldenrod, Milk Weeds, Clovers, Partridge Pea, Black-eyed Susan, etc.

Brush & tree species: Rough-leaved Dogwood, Sumac and Western Cedar

### •Woodland in early stage of succession

Dominant canopy species: Osage, Elm, Black Walnut, Hackberry, Honey Locust & Redbud

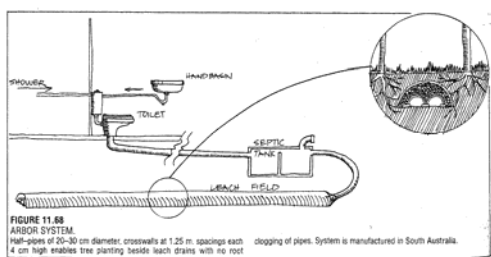
Dominant understory species: Coralberry, Gooseberry, Wild Grape, Virginia Creeper



## Farm Layout



## Hydrogeology & Nutrient Recycling



Subterranean collaterals 30 inches below soil surface



## Vineyard & Garden 2008



## Farm Resources



24 x 36 ' greenhouse

Garden tool shed & rain barrels



## Healing Garden



## Mandala Garden



< 2004



2008 >

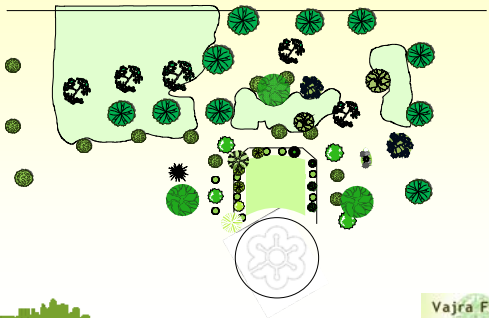


## Current Farm Activities

- Building the food forest
  - Planting nut & fruit trees: Chestnuts, Hazelnuts, Pecans, Shellbark Hickory, Paw Paw, others
- Creating forest guilds
  - Establishing supporting companion plant associations
- Establishing new food production gardens
- Earthworks projects



## Food Forest Plan 2009



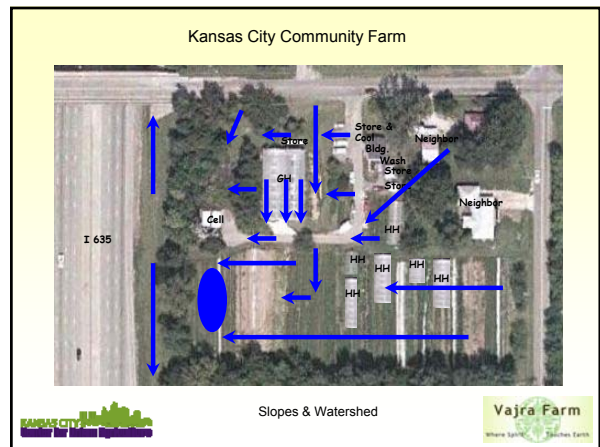
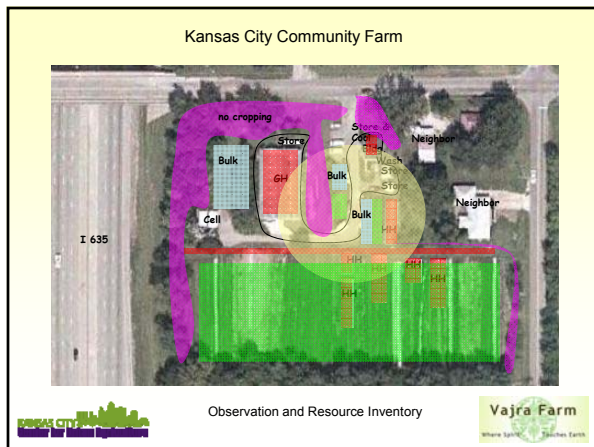
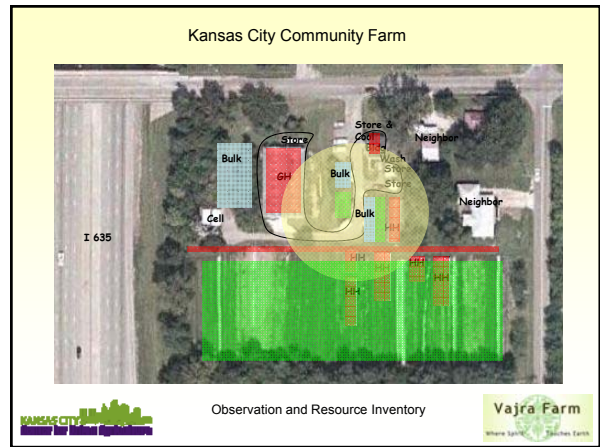
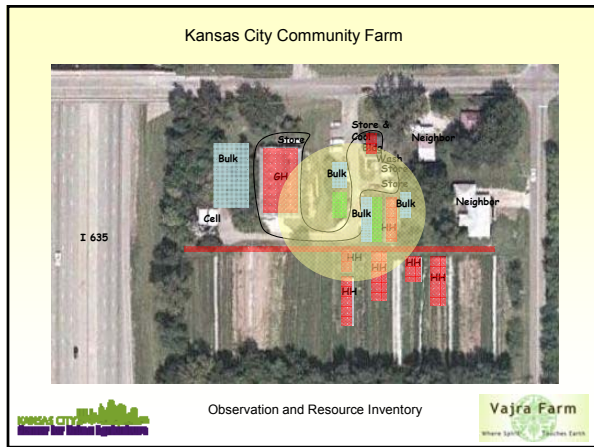
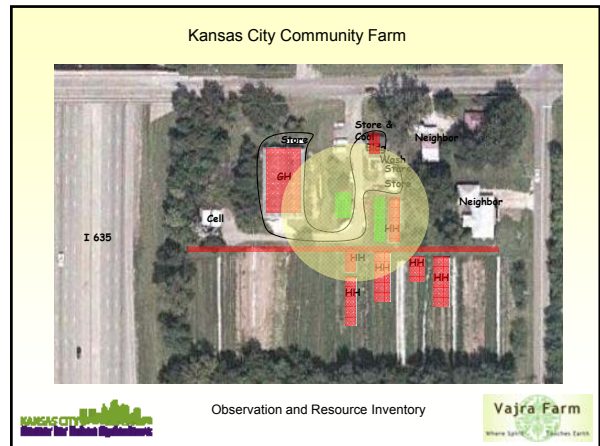
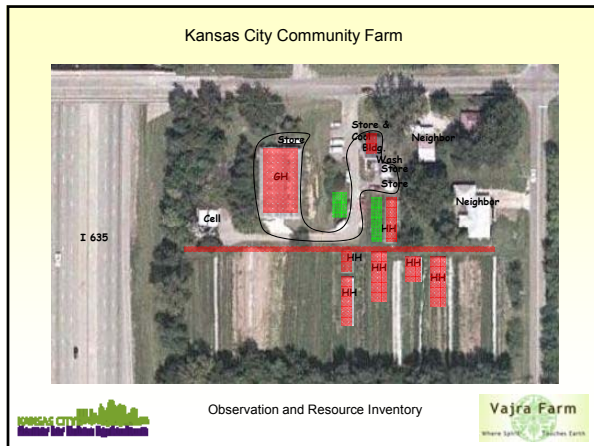
## Suntrap Garden

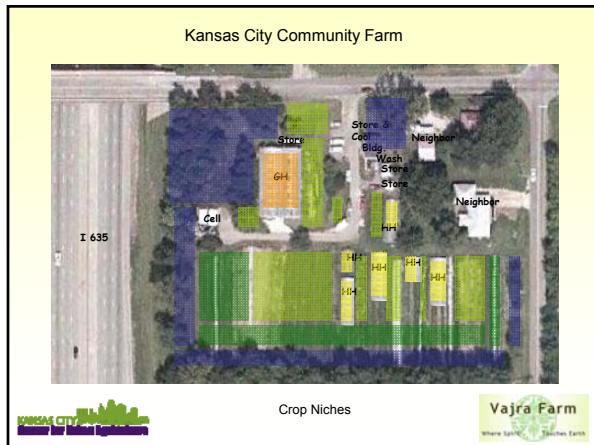
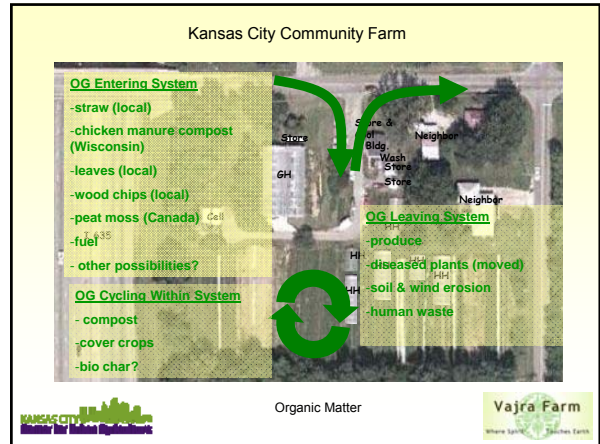
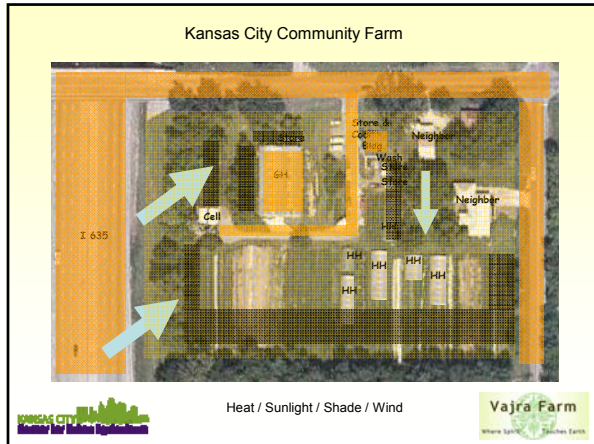


- Raised Bed
- No-Till
- Synergistic
- Polyculture









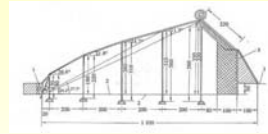
Kansas City Community Farm



Heat Resources



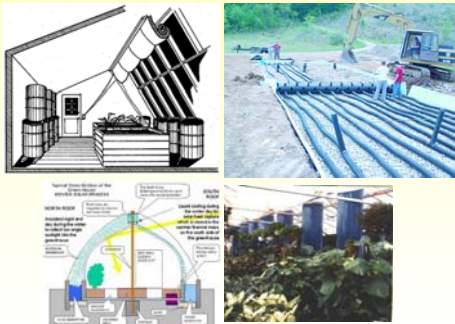
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Heat Resources



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Stacking Functions



Kansas City Community Farm



Cropping Systems



Kansas City Community Farm



Cropping Systems



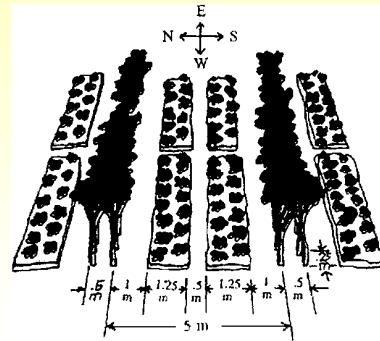
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Cropping Systems



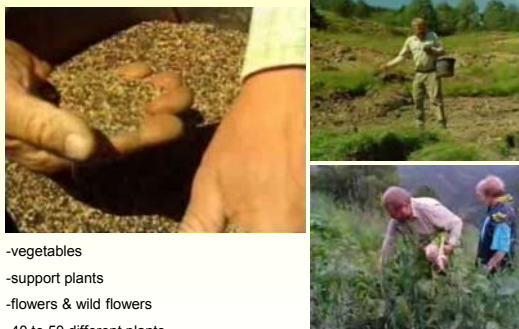
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Cropping Systems



Kansas City Community Farm



- vegetables
- support plants
- flowers & wild flowers
- 40 to 50 different plants

Cropping Systems



Kansas City Community Farm



Biochar experiment

