

Whole Farm Approach of Soil and Plant Health at Roxbury Farm

Jean-Paul Courtens and Jody Bolluyt
Roxbury Farm, Kinderhook, NY

1. Farm Overview

Roxbury Farm consists of 350 acres of land. 200 acres of land is utilized for hay, pasture, 45 acres for soil building crops and another 45 acres for vegetables. The remainder is taken up by forests, wetlands, or is developed.

Agricultural Principles at Roxbury Farm as articulated by Rudolf Steiner in 1924: "A farm is true to its essential nature, in the best sense of the word, if it is conceived as a kind of individual entity in itself — a self-contained individuality. Every farm should approximate to this condition. This ideal cannot be absolutely attained, but it should be observed as far as possible. Whatever you need for agricultural production, you should try to possess it within the farm itself (including in the "farm," needless to say, the due amount of cattle). Properly speaking, any manures or the like which you bring into the farm from outside should be regarded rather as a remedy for a sick farm. That is the ideal. A thoroughly healthy farm should be able to produce within itself all that it needs."

2. Plant and Soil Health

Strategies at Roxbury Farm to support good soil and plant health:

I. Soil Selection

- A high carrying capacity (carry the weight of equipment without creating irreversible compaction)
- Good natural or artificial drainage
- Good access to irrigation water
- A deep A horizon (topsoil) that is free from stones
- Is almost flat with slopes that do not exceed 2%.
- Is located in a long season micro climate
- Good exposure to sunlight
- Good air drainage to avoid late spring frosts.
- Good access to farm roads
- High CEC value (Cation Exchange Capacity)

II. Mineral Balancing and Nutrient Budgeting

Use of fertilizer is based on needs of individual crops and how much nutrients are removed from farm whereby Calcium occupies approximately 65% of the available cations. pH is corrected until it reaches about 6.3. Calcium and magnesium are brought in with lime and gypsum. NPK are brought into the farm by means of composted poultry manure. N and K is brought in from nearby hayfields or from

vegetable fields in the form of mulch, and N is brought into the farm by nitrogen fixation by the means of leguminous soil building crops.

III. Reduced Tillage

- Short intervals between Green Manure and Cash Crop
- Use of Less aggressive Tillage Tools
- Use of Plasti-Culture in combination with Mulch
- Avoid working the soil too wet
- Use wide radial tires for field prep
- Lower tire pressure during spring field work (6-15psi)
- Ballast tractor to 10-15% wheel slippage

IV. Increase Biological Activity

➤ **Compost**

Use sparingly to avoid overloading soil with Phosphorus

➤ **Soil Building Crops:**

- Reduce nutrient leaching
- Reduce soil erosion
- Increase soil structure
- Increase living OM fraction
- Fix nitrogen
- Increase general species diversity
- Reduce weed pressure
- Reduce insect pressure
- Reduce disease pressure

Examples of bell beans with oats, bell beans with peas and oats, oats and peas, rye and vetch, sorghum with forage soybean, buckwheat, sweet clover, mustard and tillage radish.

➤ **Crop Rotation:**

year 1	barley, peas, bell beans
	broccoli, cauliflower, kale
	broccoli, cauliflower, kale
year 2	spring fallow
	sorgum sudan grass, forage soybean mix
	late summer fallow followed with oats
year 3	potatoes or spring fallow
	potatoes, or wintersquash
	rye and hairy vetch
year 4	rye and hairy vetch for straw
	summer bare fallow
	oats and peas
year 5	spring fallow
	carrots, beets, celeriac, parsnips and sweet potatoes
	carrots, beets, celeriac, parsnips and sweet potatoes
year 6	back to year 1

Common insect problems at Roxbury Farm	Rotation	Length	Affected Crop	Notes
aphids	limited	1 year	many crops, different species	limit on nitrogen fertilizer
armyworm, common	no		cole crops	migrates from south
cabbage looper	no	1 year	cole crops	migrates from south
carrot rust fly	yes	1 year	carrots	plant upwind
Colorado potato beetle	yes	1 year	potato, eggplant	plant succession far away
corn ear worm	no	1 year	sweet corn	migrates from south
cucumber beetle striped	yes	1 year	cucurbits	use trap crops
cutworm black	no		many plants	fall plowing, weed control
cutworm variegated	no		many plants	both cutworms are migratory
European corn borer	yes	1 year	sweet corn, peppers	shred stalks in fall, plow under
fall armyworm	no	1 year	sweet corn	migrates from south
flea beetles	yes	1 year	cole crops, eggplant	plant succession far away
imported cabbage worm	limited	1 year	cole crops	can fly large distances
Japanese beetle	no	1 year	basil, corn,	can fly large distances
leaf miners	yes	1 year	beets, chard, spinach	weed control
leafhopper potato	no	1 year	potato, lettuce, snap beans	migrates from south
squash bug	yes	1 year	summer squash, cucurbits	plant succession far away
squash vine borer	yes	1 year	cucurbits	
stalk borer common	yes	1 year	tomato	
stink bug	limited	1 year	many plants	overwinters in sod and hedgerows
tarnished plant bug	limited	1 year	strawberry, lettuce	many hosts, weed control
thrips onion	limited	1 year	alliums, colecrops	manage hayfields
tomato hornworm	limited	1 year	tomato	can fly large distances
whitefly	yes	1 year	lettuce, tomatoes	hygiene
wireworm	yes		many crops	when issue reduce OM input

Common diseases	at Roxbury Farm	Common name	Rotation	Length	Affected Crop
Alternaria	brassicicola	early blight	yes	4 years	cole crops
Alternaria	solani	early blight	yes	4 years	tomato, potato
Alternaria	dauci	early blight	yes	4 years	carrots
Bremia	lactuca	downy mildew	yes	2-4 years	lettuce
Cercospora	beticola	leaf spot	yes	5 years	beets
Clavibacter	michiganensis	bacterial canker	yes	6 years	tomatoes
Erwinia	tracheiphila	bacterial wilt	yes/no	2-4 years	cucurbits
Erysiphe	cichoracearum	powdery mildew	no	airborne	cucurbits
Erysiphe	cruciferarum	powdery mildew	no	airborne	cole crops
Hyaloperonospora	parasitica	downy mildew	yes	2-4 years	cole crops
Phytophthora	capsici	phytophthora blight	yes	4-5 years	peppers, cucurbits
Phytophthora	Infestans	late blight	no	freeze/airborne	tomatoes, potatoes
Plectosporium	tabacinum	downy mildew	yes/no	4 years/airborne	Cucurbits
Podosphaera	xanthii	powdery Mildew	no	airborne	Cucurbits
Pseudomonas	syringae	bacterial speck	yes	2-4 years	tomatoes
Pseudoperonospora	cubensis	downey mildew	no	airborne	cucurbits
Rhizoctonia	solani	root rot, belly rot, black rot	yes	10 years	cabbage, lettuce, potato, tomato
Septoria	lycopersici	septoria Leaf spot	yes	4 years	tomato
Ustilago	maydis	corn Smut	no	airborne	
Verticillium	albo-atrum	verticillium wilt	yes	13 years	eggplant, many hosts
Xanthomonas	campestris pv. vesicatoria	bacterial leaf spot	yes	2-4 years	peppers, tomatoes