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Species by Function Lists

Nitrogen Fixers

Caragana arborescens
 Eleagnus spp.
 Maackia amurensis
 Robinia pseudoacacia
 Sheperdia canadensis

-Nitrogen fixing plants form a symbiotic relationship with bacteria in which the plant provides the bacteria with sugars while the bacteria makes available to the plant atmospheric nitrogen that the plant otherwise could not use. Through leaf fall and root turnover (roots and thus nitrogen rich nodules are constantly growing and dying) nitrogen fixing plants provide for a considerable portion of the nitrogen available to an ecosystem (especially one in early succession). If 30% of an orchard is planted to black locust, no nitrogen, Ca or K will have to come in from off-sight.

Dynamic Accumulators

Acer spp.
 Betula spp.
 Carya spp.
 Fagus spp.

Gaultheria spp.
 Juglans spp.
 Malus spp.
 Quercus spp.
 Robinia pseudoacacia
 Symphytum officinale
 Tilia spp.

Dynamic accumulators are plants that accumulate minerals in their body, making them available to plants that otherwise would not have access. One comfrey plant per square meter under a fruit tree accumulates and makes available enough Ca, K, P and Mg to satisfy the needs of most fruit trees.

Insectory

Acer spp.
 Alnus spp.
 Amelanchier spp.
 Arctostaphylos uva-ursi
 Aronia melanocarpa
 Asimina triloba
 Betula spp.
 Calycanthus floridus
 Caragana spp.

Carya spp.
Castanea spp.
Cornus mas
Corylus spp.
Crataegus spp.
Genista spp.
Hippophae rhamnoides
Juglans spp.
Maackia amurensis
Mahonia spp.
Malus spp.
Pinus spp.
Prunus spp.
Pyrus spp.
Quercus spp.
Ribes spp.
Robinia pseudoacacia
Sambucus spp.
Shepherdia spp.
Sorbus spp.
Tilia spp.
Viburnum spp.
Vitis spp.
Yucca spp.

-Insectory plants provide food and or shelter to beneficial insects. All plants provide for insects in some way but the plants listed above are 'special' in one

Diospyros virginiana
Eleagnus spp.
Fagus spp.
Gaultheria spp.

way or another. These plants help create a diverse cultivated ecosystem eliminating the need for anything other than biological controls.

We cannot guarantee that we will have available all the plants in the catalogue at all times. We may even have more of a selection by the time you come in. Price is subject to change without notice. In an attempt to keep the price of plants as low as possible and to reduce our ecological footprint we have a policy of charging a deposit for pots. In addition to the price listed in the catalog a fee for each pot will be charged. \$2 for the smaller pots \$3 for the larger ones and \$4 for the extra large ones. When the pots are returned to us we will refund the price of the pot. Happy Planting!

Fruiting Shrubs

Amelanchier alnifolia-Juneberry, Serviceberry.

The Juneberry loves to grow in this region and we love it. In early spring keep your eye out for masses of white flowers on a lanky shrub, if you're lucky you will have many a Juneberry already growing near you. An intermediate succession species, Juneberries are found in thickets, along forest edges and quite often striving for light in a densely regenerating forest. The fruits are relished by birds, bear and anything else that comes across them. The fruit is less acid than most native fruits. Its sweetness is followed by an almond like aroma that hangs on your nose. Bees love this multi-stemmed tree as well, the flowers are born early and make a good forage. The timber is very hard, strong, close grained, heavy, and a beautiful red traditionally used for fishing poles and tool handles. Juneberries grow quickly in most soils as long as they are well drained. A. alnifolia is more drought tolerant and wind firm than most species in the genus. Juneberries can be planted as a specimen or in a hedge at three foot spacing.

They grow to a mature height of 6-16 feet. Juneberreries are hardy to zone 3 (-40 f). As with any wild fruit they generally will produce more fruit in a cultivated setting. We carry the varieties Northline and Smoky, as well as seedlings.

Northline: A selection from Alberta, Canada Northline is a compact shrub to six feet. Very productive of delicious fruit. Extremely cold hardy to -50 degrees f.

Smoky: Most common commercial variety with large sweet fruit. Productive and vigorous to 10 feet. Hardy to -40 f.

Selected variety: 1gal-11\$ 5gal-18\$

Seedling: 1 gal-9\$ 5gal-15\$

Amelanchier stolonifera

A dwarf juneberry to 6ft high and wide. Delicious purple fruit enveloping the shrub. Will spread via runners so plant in a place to take advantage or dig up runners to start a colony somewhere else.

Seedling 1gal-\$9

Aronia Melanocarpa- Black Chokeberry

A native shrub 3-6 feet tall usually found growing near a body of water. Aronia is an easy species to grow, even tolerating wet soils. It is often grown as an ornamental because of its white flowers, purple fall color and compact shape. Despite the name Chokeberry, the fruits of this species make a unique and very tasty jelly or preserve, somewhat like black currant. They are very popular in eastern Europe and Russia where they are grown commercially. The fruits are similar but more potent than cranberries and blueberries in their health effects, strengthening the urinary tract and heart. The fruits are also high in pectin and can be added to other jams to help them set.

Seedling: 1gal-\$8 5gal-\$14

Cornus Mas- Cornelian Cherry

Cornelian Cherry is an easy to grow shrub to 16 feet tall and wide. It grows in any well-drained soil, is wind firm, drought tolerant, and will flower and fruit in the shade. Plants can be trimmed to be kept smaller and can make an impenetrable hedge. The flowers are born early and make a good early season forage for bees. The fruits are the largest in the dogwood family. They can be eaten out of hand but more commonly they are made into a juice, jam, candied, or dried. The wood is very hard, tough, flexible, and durable; it is denser than water. It was used by the Romans as splitting wedges, bolts, spokes of wheels, and pins. We offer small seedlings of a variety, Redstone, selected in Turkey for large sweet fruit.

Seedling: 1gal-\$8

Crataegus spp.- Hawthorn

Hawthorns are a good easy to grow multiple use shrub. They tolerate most soils including heavy clay. Hawthorns are an intermediate succession species found growing along edges and in thickets. They fruit best in full sun, are drought tolerant, and even can withstand waterlogged soils. Hawthorns are in the same family as pear,

which you can graft on to any Hawthorn; the advantage being you can grow pear in wetter sites. Hawthorns make a good windbreak and an impenetrable hedge. Their fruit is a pome, like an apple, and can be eaten out of hand. The fruit and leaves have medicinal properties (helps with circulation) and are good in tea.

We offer two Hawthorns.

Crataegus laevigata-English flowering Hawthorn

Crataegus phaenopyrum-Washington Hawthorn.

Seedling: 1gal-\$8 5gal-14\$

Eleagnus multiflora-Goumi

Goumi is a member of a very important family, Eleagnacea. All species in this family form a symbiotic relationship with frankia bacteria in root nodules. The bacteria make atmospheric nitrogen available to the plant and in exchange the plant provides sugars to the bacteria. Most of us are familiar with legumes (beans, peas, etc) that form a symbiotic relationship with rhizobium bacteria, unfortunately for us northerners most legumes are tropical species. One of the reasons the Eleagnacea family is so important is that they thrive in northern ecosystems filling a critical role in ecosystem health. Eleagnacea species fix large amounts of nitrogen and make available to other plants (via leaf fall and root nodule turnover) 240kg/Ha/year (100kg/acre/year). Eleagnus species make great companion crops and at a ratio of 3:1 (crop tree: eleagnus) they can increase yields significantly. Eleagnus species are also great for hedges and windbreaks as they are wind firm, drought tolerant, pruneable, and will grow quickly in any soil so long as it is not waterlogged. Goumi is one of the members of this family that has the bonus of producing tasty little fruits. The fruits are very high in minerals and surprisingly fatty acids. The lycopene content (an anticancer molecule) of Goumi is off the charts. Goumi is also shade tolerant and can be interplanted with nut trees as long-term nurse crops. It is insect pollinated and makes good forage for bees. Goumi grows to a height of 10 feet with a 7 foot spread and is hardy to -25 degrees.

Seedling: 1gal-\$8

Hippophae rhamnoides-Seaberry

Everything just said about Goumi can be said of Seaberry as Seaberry is also in the Eleagnacea family. Well not everything; Seaberry requires full sun and the lycopene content is not as high. Seaberry is wind pollinated and dioecious (or “two houses”) so both male and female plants are needed to produce fruit. One male can pollinate up to six females. Seaberry grows quickly to a height of 20 feet on any soil including heavy clay or pure sand. It is used extensively to stabilize soils. The fruit is a bright orange and covers branches completely. In Russia to harvest the fruit they cut the branches off. The fruit is tart and best made into a juice of jam. I have found that mixing a handful of Goumi fruits and Seaberry fruits together creates a tasty treat. The fruit is chocked full of minerals and is sometimes sold in health food stores as a juice for unreasonably high prices considering the yields of one plant. Seaberry is hardy to zone 3.

Unsexed seedlings 1gal-\$8 5gal\$16

Prunus japonica x P.jacquemontii- Bush Cherry

Late flowering and ripening bush cherry to 4ft tall and wide. Extends the pie cherry season into late September. By this time the birds have generally stopped eating red fruit. Another advantage is in the spring as these bush cherries flower later than other cherries protecting them from most spring frosts. You can expect 8-10lbs per plant. Fruit size is similar to other pie cherries. Will ripen fruit in the shade. We offer three varieties: Joy, Jan and Joel.

Cutting 1gal-\$8

Wild Prunus Species

By 1900 over 300 native plum cultivars had been described. All have edible fruit and most edible seeds. They provided copious food for colonial farm families (not to mention native peoples). In the 20th century interest has waned as agriculture has specialized. Most fruit varieties we have today have been selected and bred for qualities that may or may not be good if we are hoping to create a permanent agriculture. Qualities such as uniform ripening (both in season and across season) and shelf life are good for the industrial grower but not necessarily for the small grower, consumer, or environment. Everyone who gardens is to some extent a breeder. We can choose to select plants for reasons that benefit us, not agribusiness. Qualities such as shade tolerance, low maintenance, increase in harvest period, increase in flowering time to benefit more insects, increased nitrogen fixation.....etc. The list is long. A good place to start is by planting in your landscape wild species of genres such as prunus (plum, cherry) or malus (apple) to start back at the beginning and go from there.

Prunus armeniaca-Manchurian Apricot

Seedling apricot. Height to 25 feet, hardy to zone 4. Tasty fruit.

Seedling 1gal-\$8 5gal-\$16

Prunus besseyi-Sand Cherry

A small shrub growing to seven feet and hardy to zone 3. Beautiful white flowers are followed by sweet purple fruit up to 18mm across. Drought tolerant.

Seedling 1gal-\$8 5gal-\$14

Prunus cerasus-Sour or Pie Cherry

Shrub to 10-12 feet high and hardy to zone 3. Self-fertile, easy to grow, tolerating heavy wet soil and shade. Fruits sour but excellent cooked.

Seedling 1gal-\$9 5gal-\$16

Prunus nigra- Bounty Plum

Wild plum native to the northern eastern forest. Very cold hardy to zone 2. Fragrant white flowers followed by red fruits 20-30mm across.

Seedling 1gal-\$8 5gal-\$15

Prunus padus- Bird Cherry

Native European cherry to 40 feet, hardy to zone 3.

Seedling 1gal-\$8 5gal-\$15

Prunus serotina- Black or Rum Cherry

Native cherry to 70 feet hardy to zone 3. Delicious fruit. Much sought after for its lumber. Back in its hey day it was sometimes sold as mahogany as even experts could not tell the difference. Now saw logs are so rare that Black Cherry is comparable in price to Mahogany, and Sweet Birch (*Betula lenta*) is made to imitate it.

Seedling 1gal-\$8 5gal-\$15

Prunus tomentosa- Nanking Cherry

Drought tolerant shrub to 6-10ft. Hardy to zone 3.

Seedling 1gal-\$8 5gal-\$15

Ribes species- Black and Red Currant, Gooseberry

The fruits of *Ribes* spp. strong flavor and their being an alternate host to White Pine blister rust have delayed their introduction into most gardens. Interest is increasing as the fruits are delicious (at least to those not addicted to hollow sugar explosions) out of hand and make great preserves. *Ribes* grow best in cool climates such as ours and are hardy to zone 3. They grow best in well-drained loamy soil with a neutral pH (6.7-7). Growth is to 4-6ft. The fruit is high in antioxidants and phenols. *Ribes* will fruit in the shade but will fruit better in full sun. They will produce for about 15 years. All of our *Ribes* varieties are resistant to White Pine blister rust and mildew. All are self-fruitful.

Consort Black Currant-strongly flavored fruits on a vigorous and productive bush.

Black Velvet Gooseberry-very flavorful purple gooseberry.

Hinnomaki Red Gooseberry- very sweet large fruit. Cold hardy to zone 2.

Johns Prairie Gooseberry- high yields of large dessert quality fruit. Very disease resistant and cold hardy to zone 2.

Jonkeer van Tets Red Currant- Very productive-20lbs of fruit per plant.

Red lake Red Currant- Late flowering red currant.

Jostaberry Black Currant x Gooseberry- Thornless shrub producing fruits that are midway in size between a currant and gooseberry. Mild black currant flavor. Vigorous and productive.

All of our varieties are clones propagated by cutting.

1gal-\$9 5gal-16\$

Rosa rugosa- Rugosa Rose

Dependable flowering species rose is easy to grow on any well-drained soil. No need to dose with fertilizer or pesticide. Produces very large hips that are loaded with vitamin C.

Seedling 1gal-\$7 5gal-\$12

Sambucus species- American and Black Elderberry

The elderberries fantastic growth habit has induced images of fairies and goblins throughout the ages. Their long straight shoots can reach 12-15 feet high. They grow well on most soils and are cold hardy to zone 3. The fruits and flowers are edible but the wood, bark, and leaves are all poisonous. We offer two clonal varieties propagated by cutting.

Johns Elderberry- The highest yielding variety producing up to 30 lbs of fruit per year. Will start to produce the second year after planting.

Sampo Elderberry - A bit smaller in size and not quite as productive as Johns. Produces large clusters of black fruit.

1 gal-\$9

5gal- \$16

Sheperdia Canadensis- Buffaloberry

Another member of the Eleagnacea tribe (see page 13 under Eleagnus multiflora). Buffaloberry is native to the North American prairies. Fruit is similar to Seaberry. Natives would mix the fruit with buffalo fat. Grows quickly to 12 feet in a well-drained soil with full sun. Drought and wind tolerant.

Seedling 1gal-\$9 5gal-\$16

Vaccinium spp.- Blueberries

We offer 13 highbush varieties and one lowbush. The highbush grow to 5-6 feet with equal spread while the lowbush will grow to 3 feet. All blueberries require a very acid soil (pH between 4-5.5). They are quite heavy feeders and are not drought tolerant. An acid mulch such as pine needles is quite helpful. Blueberries do NOT have to be planted in peat. As long as the soil is acid enough (and not waterlogged) the plants will grow fine (so long as their nutrient and water requirements are met). Plants are quite long lived and will produce for many decades.

Blue crop-very vigorous mid-season berry producing up to 10 quarts of berries per bush.

Blue Ray-very large fruit size, good flavor, productive up to 25lbs of fruit per plant but more commonly 15lbs.

Chandler-Mid to late ripening large fruits. Very vigorolous and productive.

Duke-Early to mid ripening, medium sized fruit of mild flavor. Vigorous and dependably producing plant.

Elizabeth-highly aromatic mid-late season blueberry. Very large fruits.

Elliot- Late season blueberry. Good choice to extend your blueberry season.

Vigorous plant producing up to 25lbs of fruit per plant.

Hannahs Choice- Earliest ripening blueberry. Average size berries on a vigorous plant. Very sweet fruits with low acidity.

Jersey- Late season small berry with excellent flavor.

Nelson- Mid to late season medium sized fruit on a vigorous bush.

Northland- Early to mid season small fruits on a bit smaller bush. Wild type flavor.

Patriot-Early season large fruit with good flavor.

Rubel- Very tall bush up to 8 feet. Late season small fruit of good flavor.

Toro- Early to midseason, medium size fruit.

Chippewa- Low bush cultivar to three feet. Medium size fruits with heavy yields. Hardy to zone 3.

All of our blueberries are propagated by cutting

1gal-\$9 5gal-\$18

Viburnum dentatum-Arrowwood

Viburnum is the genus of cranberry. They all thrive in very acid soils and are extremely hardy. Viburnums are good choices for heavy wet soils. Arrowwood is native to eastern N. America. It is a large shrub to 16 feet with beautiful white flowers and blue-black fruit with a pleasant sweet flavor. They are edible raw or cooked. The name Arrowwood comes from the fact that the shoots were used to make arrows.

Seedling 1gal-\$8 5gal-\$15

Viburnum opulus-Cranberry Tree or Cramp Bark

Large shrub to 15 feet. Fruits are edible raw or cooked, although large quantities of raw fruit can cause nausea. The bark is used medicinally in the treatment of menstrual pain and spasms after childbirth. A red dye and ink is obtained from the fruit. It is a good hedge plant and produces good bee forage. Hardy to zone 3.

Seedling 1gal-\$8 5gal-\$15

Viburnum prunifolium-Black Haw

Unlike most viburnums, which require plenty of moisture, Black Haw can tolerate poor dry soil. Very similar to *V. opulus*. Bark used like cramp bark, good bee plant and hedging plant.

Seedling 1gal-\$8 5gal-\$15

Viburnum trilobum-High Bush Cranberry

Native shrub to 10 feet. Fruits ripen in October but generally hang on the bush all winter. Bark used similarly to *V. opulus*.

Seedling 1gal-\$8 5gal-\$15

Fruiting Trees

Asimina triloba-Pawpaw

Pawpaw is the largest fruit native to North America. It is also the most northern representative to the dominantly tropical family Anonacea. Tropical travelers may be delightfully familiar with this family as it produces some of the tastiest fruits on the planet: cherimoya, custard apple, soursop and the Pawpaw. Pawpaws are native to as far north as central MI and southern Canada. It is often found growing (and fruiting) in the understory below Beech and Maple and in flood plain forests. Because of its propensity to be found in flood plain forests some people believe that Pawpaws need rich moist alluvial soil to thrive. This does not seem to be the case as they grow well in upland soils. Their being dominantly found in flood plain forests seems more to

have to do with propagation. It is believed that the Pawpaws vehicle of dispersal is extinct. Pawpaws very large fruit attracted very large mammals. With the extinction of the megafauna the Pawpaws ability to move up hill came to an end. Now the only time Pawpaw seeds move is when they are swept away in a current to be hopefully deposited in downstream soil. The extinction of the megafauna had cascading ecological effects. One of those was the extinction of many dung beetles some of which probably pollinated the Pawpaw. The most frustrating thing for the Pawpaw grower is their inability to get the tree to set fruit. Some believe carrion flies are their pollinators and will hang dead animals in the trees, but most will resort to hand pollination. Two trees are needed to set fruit. The fruit has many names indicating its use in many regions; wherever it is found + banana (hence MI banana), false banana, stubby banana, custard banana. The reference to banana indicates both the fruit taste and the clusters of fruit which resemble bananas. Unlike most temperate fruits the pawpaw is not acidic, just pure custard goodness.

The Pawpaw is a deciduous tree 10-26ft tall that will sucker, forming a thicket. We try to plant it where we can take advantage of this characteristic. In fact it is a good mode of propagation both for the Pawpaw and us as a single trunked tree will live and fruit for a fraction of the time that an evolving thicket will. The leaves are large and tropical. It is hardy to zone 5 and has survived -20f in our nursery. They are tap rooted and quite wind firm. Pawpaws do fruit in the shade in hot climates but in a cooler summer climate like ours it is best to consider it a sun and heat demanding tree. Pawpaws are disease and pest free and require very little maintenance. They are generally very true to seed. We sell seedlings of varieties selected for their ability to fruit in cool short seasons.

Seedling 1gal-\$12 5gal-\$21

Diospyros Virginiana-American Persimmon

The American Persimmon is the farthest north representative of the ebony family. It is native to the eastern forest from Florida to Connecticut. Like other members of the ebony family the American Persimmon has black heartwood. It is highly valued for its elastic, stable, and tough wood whose primary use is golf club heads. The fruit is relished by anything that comes across it. It is about the size of a golf ball, orange and very sweet. The only problem is that in a cool short summer the fruits will not ripen, hanging on the tree all winter making them good for nothing but frozen golf balls. When not ripe a persimmon causes serious oral consternation being extremely astringent. The tree is gorgeous and makes a great ornamental. Unlike most fruit trees that break dormancy after a certain number of chilling hours (below 35 degrees) the Persimmon breaks dormancy after a certain number of heat units. This allows the flowers to escape spring frosts. The tree reaches a height of 40-65 feet. The Persimmon grows well on all soils so long as they are not waterlogged. It is drought tolerant but needs protection from strong winds as its branches are brittle. Both female and male plants are needed for fruit production. They are pest free and like the Pawpaw (unlike most every other fruit tree) need little to no maintenance. American Persimmons have not been overbred and seedlings of selected varieties generally

produce similar fruit. We offer seedlings of plants selected for their ability to ripen fruit in a cool short summer. Hardy to zone 4.

Seedling 1gal-\$9 5gal-\$15

Malus spp.- Apples

Apples are everyone's favorite exotic invasive. They are ubiquitous in early to intermediate succession ecosystems on the Bayfield peninsula. We have bears to thank for their spread locally and for their evolution in the Tian Shan mountains of Kazakhstan where they are native. It seems that the ancestor to today's apple was the Siberian crab, a bird distributed cherry-sized apple. Bears, and perhaps humans, selected and distributed about the largest and juiciest among them. Today the forests of the Tian Shan are littered with apples of all sizes growing in all levels of the structure of the forest. It seems like shade tolerance was bred out of today's apple and it would not be much to bring it back as some apples on our land fruit well in the shade. The common myth that one out of a thousand apple seedlings will produce good fruit is hard to understand when at least 80% of the wild apples I've tried up here are delicious. So walk about the forests in the fall tasting apples, find the tastiest and name them, graft them onto a rootstock and you will be adding to the tremendous diversity that already exists in apple varieties.

Standard (on Antanovka rootstock). Will produce a well anchored 25 foot tall tree. Grows well on all well drained soils including clay. Takes up to ten years to start bearing but will then bear fruit for many decades.

Haralson- Vigorous and productive tree starts to bear early. Medium size dark red apple good for fresh eating and cider but best baked. Ripens early October. Resistant to fire blight and cedar-apple rust. Store for 4-6 months. Hardy to zone 2.

Nova Easy Grow- Very resistant to scab and cedar-apple rust. Moderately resistant to mildew and fire blight. Large, firm, and crisp fruit ripens in October. Hardy to zone 2.

Zestar- Good sweet-tart flavor with an above average storage life. Hardy to zone 4.

Semidwarf Produces trees from 12-20 feet tall. Generally start to bear earlier than standard rootstocks but are not as long lived.

Fireside (on EMLA 111)- Crisp, sweet, and juicy flesh. Good keeper. Resistant to cedar-apple rust. Hardy to zone 2. EMLA 111 rootstock will produce a tree 21 feet tall.

Honeygold (EMLA 7)- Cross between Golden Delicious and Haralson. High quality apple. Very good keeper. Hardy to zone 2. EMLA7 produces a tree 12-16 feet tall. Moderate anchorage, should be staked for five years.

Keepsake (M7)- Keeps in storage through April. Strong aromatic flavor. Fruit is very hard when picked but softens in storage. Peak eating is in January/February. Resistant to fire blight and cedar-apple rust. Ripens into November. Hardy to zone 2. M7 rootstock produces a tree 12-18 feet that requires staking the first five years.

Sweet Sixteen (EMLA 7)- Excellent all around apple. Hints of anise when eaten fresh. Slightly nutty favor baked. Resistant to scab and fire blight. Hardy to -50 degrees.

Wealthy (EMLA 7)- Crisp and very juicy fruit with white flesh and pink veins. Distinctive flavor with a hint of strawberry. Bears early. Excellent pollinator. Resistant to scab, fire blight, and cedar-apple rust. Hardy to zone 2.

Dwarf Good for small gardens and situations where you want fruit soon, as dwarfing rootstock will start to bear soon after planting. The downside is that they will only produce for just over a decade and they need permanent staking as the root systems aren't well anchored. One idea is to plant a standard and a dwarf in the same spot. Just as the dwarf is going offline the standard is starting to fruit.

Honeycrisp (Bud 9)- Excellent apple. Very crisp when fresh. Keeps five months in storage. Hardy to zone 3. Bud 9 rootstock produces a tree 6-8 feet in height that needs permanent staking.

Grafted- \$21

Prunus cerasus- Pie or Sour Cherry

Sour cherries are an easy to grow tree. Ours are on Mahaleb rootstock and reach 10-12 feet tall. They grow and fruit in almost any soil and can even withstand occasional water logging and shade. The fruits are too acid for most but are delicious cooked. Sour cherries are more disease resistant than their sister sweet cherry. They are later flowering than most sweet cherries but will cross pollinate with late flowering sweet cherries.

Meteor- Densely foliated small tree. The density can help in deterring birds. Meteor is self-fertile and early bearing. Hardy to -50 degrees.

Northstar- Early bearing of heavy crops and large fruit. Hardy to -40 degrees.

Grafted- \$21

Prunus avium- Sweet Cherry

Sweet cherries are vigorous and productive trees. They grow well in most soils so long as they are well drained. They prefer a slightly acid medium loam.

Standard Selections are grafted onto seedlings of Prunus avium producing a large spreading tree 30-40 feet high.

Lapins - Heavy producer of excellent quality large fruits. Selected in Canada. The flowers are resistant to moderate frost. Ripens in late July. Hardy to zone 5.

Semidwarf Selections are grafted onto Colt rootstock producing a well branched tree to 15 feet. Colt is vigorous and well anchored.

Lapins- See above

Stella- Self-fertile cherry ripening in mid-June. Large dark red fruit with a rich flavor.

Semidwarf Selections are grafted onto Mahaleb rootstock producing a tree around 15 feet tall with few suckers. More drought tolerant than Colt.

Bing- Large tasty dark red fruit. Not as vigorous as some. Ripens in early July. Needs a cross pollinator. Hardy to zone 5.

Rainier- Delicious fresh eating cherry with a distinct flavor. Not as good as a cooking cherry. Very productive and early bearing. Needs a cross pollinator such as Bing. Hardy to zone 5.

Sam- Frequently used as a pollinator. Slow to come into bearing, but then a steady bearer. Blooms later than most sweet cherries. Needs a pollinator. Ripens early. Hardy to zone 5.

Van- Heart shaped bright red fruit produced on a precocious and vigorous tree. Hardy to zone 5.

Compact Stella- Similar to Stella but a natural dwarf growing to 12'. Great for smaller gardens.

Grafted- \$21

Prunus spp.- Plums

Plums are a home orchard must, as store bought plums just don't cut it. The variety in flavors and textures is amazing. For consistent fruiting, plums need a sunny sheltered site. Most soils will suit a plum, with the ideal being a fairly heavy clay loam. All of our plum selections are on Manchurian rootstock producing a vigorous and well anchored tree 10-15 feet in height.

Beauty- Developed by Luther Burbank in the early 20th century. Cross between an American and Japanese plum. In the 'oh my god' club for flavor. I've been known to eat 20+ in a sitting (under the tree of course.) Self-fertile and a good pollinator for other plums. Vigorous and precocious ripening in early-mid summer. Hardy to zone 4b.

Stanley- Precocious bearer of regular heavy crops. Blue-black fruits with a yellowish-green firm flesh. Sweet rich flavor. Cling stone. Good for drying. Late-flowering and self-fertile, although will set more fruit when cross pollinated. Ripens in early September. European type. Hardy to zone 4.

Superior- American and Japanese cross, selected for its large size, vigor, and hardiness. Fast growing and early bearing. Good pollinator. Ripens in late August-September. Firm delicious flesh. Hardy to zone 4.

Toka- American plum. Medium size fruit with rich spicy-sweet flavor. Heavy bearing. Good pollinator for other plums. Hardy to zone 2.

Grafted- \$21

Prunus armeniaca- Apricots

Apricots originated in western China. They reached Italy by the first century, England by the 13th, and this continent by the 17th. They are drought tolerant and less susceptible to pests and diseases than most other common fruit trees. They prefer a deep loam of neutral pH. Their flowers are susceptible to frost damage as they break dormancy early. Growing alliums (garlic, chives, etc) nearby Apricots is beneficial.

Standard- Scions are grafted onto Manchurian rootstock producing a tree 16-18 feet tall.

Hargrand- Productive, cold hardy, and disease resistant tree. Very large fruit with firm, smooth, orange freestone flesh. Hardy to zone 4.

Semidwarf Scions are grafted onto St. Julian A rootstock giving a tree 8-10 feet tall.

Moorpark- Very large fruit. Excellent flavor. Good for fresh eating, canning, and drying. An early and dependable producer. Hardy to zone 4.

Puget gold- Good apricot for frosty spring weather. Orange flesh. Developed by Washington State university.

Sungold- Mild sweet orange flesh very good for drying. Medium size vigorous tree requires pollination with Moorpark. Hardy to zone 4.

Grafted- \$21

Prunus persica-Peach

Peaches originated in China where they have been grown for at least 3000 years. By 300 B.C it was a component of Greek orchards and by the 17th century the Spanish had brought it to the Americas. It is hard to beat a fresh peach off the tree as they do not get better with age. The trouble with growing it in our bioregion is how early it flowers and its need for heat. We probably will not get a consistent crop year in and year out but on years when there is good weather during the flowering period and heat in the summer you can be sure you will be happy you planted a couple peaches. All of our peaches are hardy to zone 5.

Elberta- Large yellow fruit is very juicy and of high quality. Freestone flesh. A vigorous and compact self-fruitful tree.

Polly- Bred for hardiness and productivity. White skinned freestone flesh. Tender and juicy flesh.

Redhaven- Bright red nearly hairless skin. Vigorous and precocious self fruitful tree. Abundant fruit set.

Reliance- Vigorous, precocious, fast growing tree. Buds are very hardy making it a good selection for the north. Bright yellow, juicy, and sweet flesh.

Grafted- \$21

Pyrus communis- European Pear

Pears are very long-lived trees fruiting for up to 300 years. The fruits ripen off the tree and store well. Pears generally need more warmth to ripen than apples but less than peaches or cherries. The flowers blossom earlier than apples and are not as wind firm. Pears grow well on heavy soils. Pears should be considered self-sterile, meaning two varieties are needed to produce fruit. Hardy and Luscious are on Bartlett seedling rootstock producing a well anchored long-lived tree 20-30 feet. The remaining selections are on OHF 333 rootstock producing a semi dwarf tree that is fireblight resistant and suckers less than most seedling rootstocks.

Beurre d'anjou- Buttery textured French pear. Very aromatic white flesh. Keeps until late spring developing its best flavor after about two months in storage. Vigorous and productive tree. Hardy to zone 5. On OHF 333 rootstock.

Comice- Good resistance to fire blight. Good for eating out of hand, perhaps to delicate for cooking. Rich and juicy flesh. Hardy to zone 5.

Hardy- Vigorous upright tree. Smooth and juicy white to pink flesh. Aromatic with hints of rosewater. On Bartlett seedling rootstock producing a well-anchored and long-lived tree 20-30 feet.

Kieffer-Self fertile. Good storage quality. Good for baking. Hardy and vigorous tree bears early. Hardy to zone 4.

Luscious- Very hardy and productive tree. Resistant to fireblight. Small to medium sized fruits of high quality. Best eaten out of hand. On Bartlett seedling rootstock.

Seckel-Small fruit with extremely sweet and juicy flesh. Also called honey pear. Naturally semidwarf to 15'. Self fertile. Hardy to zone 5.

Grafted- \$21

Pyrus pyrifolia or *ussuriensis*- Asian Pear

Asian pears are very long lived trees (200-300 years) native to northeastern China, Japan, and eastern Siberia. They have been cultivated for many millennia in China and Japan. The fruit is different than European pear in that it is round, crisp, and juicy. Very aromatic with hints of butterscotch. The fruits ripen on the tree. They grow well in most well drained soils including heavy soil. Asian pears flower just ahead of and during European pears and are suitable pollinators. They are usually kept to a height of 12-15 feet by pruning.

Shinseiki- Diseases resistant, vigorous, and early bearing tree. Large yellow fruit is crisp with creamy white flesh. Keeps well through January. Hardy to -25 degrees.

Summercrisp- Selection from the University of Minnesota. Medium size green fruit with a red blush. Crisp and juicy flesh with a sweet and mild flavor. Hardy to -25 degrees.

Grafted- \$21

Sorbus torminalis- Wild Service Tree

Native to north Africa, southwest Asia, and Europe. The Wild Service Tree is grown for its timber which is valued for veneer, cabinetry work, turnery, carving, and also for its fruit. The fruit is small, sweet, and rich in vitamins. It is an intermediate succession species growing fast with good sun exposure in most soils including clay. The fruit is traditionally made into an alcoholic drink called chequers. The tree coppices well and the coppice will grow in shade. The fruit is relished by birds and would potentially make a good sacrificial crop. The tree can reach 70 feet but more commonly grows to 40-50.

Seedling 1gal- \$8 5gal- \$14

Nuts

Carya illinoensis-Pecan

Pecans are a late succession long lived (4-500years) tree reaching heights of 100ft plus. Possibly the most delicious of nuts. Described by J. Russell Smith as a

meat and butter tree because of its high oil content. Civilizations could be built up from the bounty of the forest thanks to trees like the Pecan. Generally considered a southern crop tree. Our seedlings come from selections over many generations for cold hardiness and ripening nuts in short seasons. Pecans need a sheltered site and prefer a well drained moist loam. Can be planted right into existing forest mimicking natural succession allowing the pecan time to develop a massive root system. When a hole opens in the canopy then the pecan will grow towards the light. And who knows, by the time the pecan is a large tree maybe we have a bit longer growing season with warmer summers. Although I'm sure climate change isn't going to be all peaches and suntans we should start to consider the implications for our bioregion and act accordingly.

Small seedlings-\$11

Carya ovata-Shagbark Hickory

Close relative of the Pecan and second cousin to the walnuts, some consider the hickory the tastiest of all nuts. The nuts are often made into a delicious milk by pressing. The bark is shaggy and peels off in long sections giving the tree a wondrous look. Very long lived trees to 500 years. Plant a grove of nuts and plan on providing abundance for 20 generations!

Small seedling-\$11

Castanea spp.- Chestnuts

Chestnut trees are large, spreading, beautiful, and long-lived trees. They are in the same family as oak and beech. Chestnuts usually start bearing by age 5. By 10 to 12 years of age you can expect an average of 55 lbs of nuts from one tree. Unlike most nuts, the chestnut is low in fat and high in protein and carbohydrates. It is like a potato field in the sky. Cultures have relied on the chestnut for their main source of sustenance. The nut has a sweet floury taste. Vendors do well selling roasted chestnuts at harvest time. They are delicious used many ways: as chestnut bread, pie, soup, pudding, stuffing, cake, or simply boiled. The nuts ripen within a prickly burr. In some cultivars this burr stays closed even after the nut is ripe, helping to keep nut predators at bay and allowing us to have at the harvest. Chestnuts need a well-drained acid soil. Once established they are very drought tolerant. The tree is a favored coppice species because of its highly nutritious leaves used as fodder and its beautiful rot resistant and strong wood. Two trees are needed for nut production.

Castanea dentata- American Chestnut

The American Chestnut once dominated the eastern forests. It was a favorite of the natives and they saw to it that one out of every six trees in the chestnuts range was a chestnut. The tallest of the chestnuts, the American can reach a height of 100 feet with a 22 foot diameter trunk! You don't see many of those around as a blight imported from China decimated our chestnut stands. The blight was originally found in 1904 at the New York zoological park. Today we are left with very few remnants of this once common tree. The largest American Chestnut in Wisconsin grows in Bayfield alongside a Red Oak and a Shagbark Hickory. It is from these remnants of the species

that breeding work has been done to create a blight resistant American Chestnut. We offer seedlings that have been selected over the last two generations for American form and nut quality (as the American has the sweetest nut in the genus). Hardy to zone 4.

Selected seedling 1gal- \$13 5gal- \$21

Castanea mollissima- Chinese Chestnut

A smaller tree with a more rounded top, the Chinese Chestnut can be planted as an orchard crop. Larger nuts than the American but not as sweet. Resistant to chestnut blight. Often back-crossed with the American to add that characteristic. Grows well in any well drained soil, even pure sand. Height of 25-30 feet. Good pollinator for all chestnuts.

Seedling 1gal- \$11 5gal- \$18

Corylus spp.- Hazelnuts

Hazelnuts and filberts have been cultivated for a long time. Peat bog pollen counts show that after the last Ice Age Hazelnuts were one of the first plants to colonize, accounting for more pollen than all the other plants combined. It is thought that Hazelnuts were a staple food to indigenous peoples across the temperate zone. Apart from their edible nuts, hazels are best known as a coppice species. The wood is soft, elastic, and easy to split. It has been used as divining rods, walking sticks, fishing rods, for basketry, waddle (as in daub and waddles walls), crates, barrel hoops, and hurdles. Hazels are an excellent species and a good fodder crop. Hazels grow well in any well drained acid soil. They are often found growing in the shade and will fruit well there. Hazelnuts are shrubs growing to 12-15 feet tall. Hardy to zone 4.

Corylus americana- American Hazelnut

Corylus avellana- European Filbert

Corylus cornuta- Beaked Hazelnut

Species seedlings 1gal- \$7 5gal- \$13

Corylus cross-hybrid of above species producing a plant that is more disease resistant and produces larger nuts.

Selected seedlings and layered plants 1gal- \$9 5gal- \$16

Fagus grandifolia- American Beech

The Beech is a strong tree. Its smooth gray bark flutes out at the base to buttress itself against the wind. The bark stays smooth even in very old specimens creating a perfect template for inscriptions. The nuts are smaller than chestnuts and higher in oil. It generally only bears heavy crops every third year or so and this wax and wane in production can be seen through a whole region. This helps keep the nut predator populations down. The Beech was very prolific in the eastern forests before the plow showed up. This is because to a pioneer finding a Beech forest meant finding a home. The settlers quickly realized that Beech trees grew in prime loam generally underlain by limestone. So it was that we lost most of our Beech forests. The Beech attracted more than just pioneers; turkey, quail, deer, and people all are fond of their nuts. The Passenger Pigeon too enjoyed the mast of the Beech. It is said that flocks

would darken the midday sky for hours as they flew over to alight, in the fall, in the Beech forests. The Beech is hardy to zone 4.

Seedling 1gal- \$9 5gal- \$17

Ginkgo biloba- Maidenhair Tree

Ginkgo biloba is the lone surviving species of an ancient genus dating back 180 million years. Ginkgo is native to here....65 million years ago. It is only found in the wild in China. It has been cultivated for millennia in China and Japan, usually planted around temple gardens. The Japanese name for the species translates into 'Silver Apricot'. Ginkgo is a very long-lived tree that is pest and disease free. It grows to an impressive height of 130 feet. It is a deciduous conifer. Both male and female trees are needed to produce fruit. The nut is a delicacy in China and Japan. The fruit, pulp, nuts, and leaves have all been used medicinally for centuries. Tea made from the leaves promotes circulation and is reputed to make one think clearly. The ginkgo will coppice in the shade producing easily harvested medicinal leaves. Ginkgos grow well in most soils so long as they are well drained. Ginkgos need to have protection from the wind.

Seedling 1gal- \$9 5gal- \$16

Juglans spp- Walnuts

Juglans are another ancient genus dating back to the dinosaurs. Different species are native to Iran (Juglans regia), Poland (Juglans regia Carpathian), eastern North America (Juglans cinera, nigra), Japan (Juglans ailantifolia), and South America (a species very similar to Black Walnut). All members of the Juglans genus produce an alleopathic substance known as juglone. Juglone is quickly detoxified by soil microbes but it is nonetheless detrimental to some species, most notably apples, white pine, potatoes, and tomatoes. Many plants are not deterred by juglone including American persimmon, pawpaw, mulberries, Black locust, eleagnacea spp., hazelnuts, chestnuts, plums, viburnums, and pears. The sap of all Walnuts makes a delicious syrup.

Juglans ailantifolia- Heartnut

In taste tests many people preferred the flavor of the Heartnut to that of the commercial walnut- Juglans Regia. They are more winter hardy (zone 4), more tolerant of late frosts, and crop better in cooler weather than the English Walnut (Juglans Regia). It is a medium size tree to 50 feet. Heartnuts are easy to grow with few pests and diseases. They require a sunny position and moist well-drained soils.

Seedling 1gal- \$9 5gal- \$17

Juglans cinera- Butternut

Also called the White Walnut or Oilnut, the Butternut is the most cold-hardy member of its tribe. To some it produces the tastiest of all nuts. The nut meat is small and the shell hard but to nut aficionados the effort is well worth it. The nuts are very high in protein. The green nuts can be pickled. The bark and green nuts are boiled to produce a brown (bark) and yellowish green (nuts) dye. The wood is much sought after

for veneer and rifle stocks. The Butternut produces the least amount of juglone of any walnut. It is a rather short lived tree to 80 years and on the shorter side for a walnut to 60-80 feet. Seedlings will begin bearing fairly early, between 5-8 years. The Butternut is native and cold-hardy to zone 3. Like most nut trees it prefers a deep, fertile well drained soil. Full sun and a fairly neutral pH (6.5) are ideal. The addition of limestone in our region would prove advantageous.

Seedling 1gal-\$9 5gal-\$17

Juglans nigra-Black Walnut

The black walnut is a massive tree. In its heyday it would reach heights of 150 feet with 6 feet of girth at chest height. The Black Walnut produces the finest cabinet wood in North America. It was cut with such abandon that there is now a door to door search for good saw logs. Beautiful shade trees are felled for more than the price of the house that they shaded. Forward thinking people plant the Black walnut as an inheritance for their grandchildren. The nuts are black and oily with a distinctive flavor. The Black Walnut produces the most juglone of any of the walnuts and is found growing in well drained yet moist loamy soil.. Hardy to zone 4.

Seedling 1gal-\$9 5gal-\$17

Juglans regia Carpathian-Carpathian English Walnut

Carpathian walnuts are found growing in the Carpathian mountains of Poland, the farthest north extent of the Persian walnut. *Juglans regia* is the commercial walnut found in stores. Large mildly flavored nuts easily extracted from a thin shell. It is a fast growing tree to 100 feet. They are long lived trees. Moist well drained soils and a sunny location are needed.

Seedling 1gal-\$9 5gal-\$17

Pinus spp.-Stone Pines

There are 18 major species of nut bearing pines. The pinenuts commonly found at market are of *Pinus pinea* and sometimes *Pinus koriensis*.

Pinus cembra-Swiss Stone Pine.

A medium size tree native to the European Alps from 30-65 ft high. The cones do not open but fall enclosing the seeds inside. A lovely snack is had if one tosses the cone upon the coals of a fire. When the nuts are well roasted the cone will pop open. Dangling the cone over ones mouth is all the rest that is needed. The Swiss stone pine is slow growing to begin and long lived. Grows well in open areas or on north slopes. A well drained acid soil is needed. Hardy to zone 4.

Seedling 1gal-\$9 5gal- \$17

Pinus flexilis-Limber Pine

Native to the western US, the Limber Pine grows to a height of 32-80 feet. A slow growing pine that is drought tolerant and wind firm. Hardy to zone 2.

Seedling 1gal- \$9 5gal- \$17

Pinus koraiensis- Korean Stone Pine

A large pyramidal tree to 100 feet closely resembling our native White Pine (except for its copious production of edible nuts). Native to Korea, northern Japan, and Manchuria. Usually found on well-drained sandy soils. Hardy to zone 3.

Seedling 1gal- \$9 5gal- \$18

Pinus pumila- Dwarf Stone Pine

Now you can have an evergreen hedge that produces nuts. To 9 feet. Long-lived. Hardy to zone 3.

Seedling 1gal- \$9

Quercus spp.- Oaks

One can easily feel unworthy when assigned with the task of describing an oak. It has been described as the king of trees, but when we look upon its form- its wide spreading crown with branches coming off at right angles to the trunk, we see more feminine qualities than masculine. Whomever is lucky enough to have a large oak nearby owns a sort of second home, many stories tall shaded by innumerable leaves. Oaks are divided into two main groups: Red Oaks (subgenus *Erythrobalanus*) and White Oaks (subgenus *Lepidobalanus*). Red Oaks have leaves with lobes that end in a point, the inner surface of the acorn shell is lined with woolly hairs, and the acorns take two years to ripen. White Oaks leaf lobes are rounded, the inner surface of the acorn is not woolly, and the acorns take one year to ripen. Our native oak, *Quercus Rubra*, is a Red Oak. Oak is the standard other woods are measured against for strength and durability. All oaks bear acorns which are edible. Some have more tannins than others, but the process to remove them is simple. Others are sweet out of hand. There is a long history of human cultures using acorns. Oaks desire a well-drained soil with full sun for best acorn production. Cross-pollination increases yield.

Quercus alba- White Oak

Generations pass and the White Oak still stands. There are trees still alive that were tall when 'America' was nothing but an Italian map makers name. There is one oak growing in a churchyard in Fairlee, Maryland that is twenty-four and a half feet in circumference breast high, 118 feet tall, and with a spread of 127 feet. White Oak is hardy to zone 4.

1gal- \$9 5gal- \$17

Quercus macrocarpa- Burr Oak

The Burr Oak is unique among oaks. Most every oak sends down a deep taproot in search of water. The Burr Oak sends down a tap root but not so deep as it also sends off countless feeder roots that run near the surface of the earth at a distance past the crowns drip edge. Their purpose is to find and extract water- even the slightest rain will suffice. The root system is immense, and for good reason. In the back and forth between prairie and forest over the millennia, the Burr Oak has been on the front

lines. In dry epochs the grass flourishes with the Burr Oak along its periphery. As a moist epoch creeps in, so too do the oaks, spaced at a healthy distance one from another as their root systems act to outdo not just the grass. The Burr Oaks are pioneers. As their numbers increase, other species of trees come in- Walnuts, Hickory, Ash, and Linden. That is unless the system is disturbed. We are now and have been for centuries in a moist epoch. Yet as the settlers rolled into the Northwest Territory (now called the Middle West) they found prairies interspersed with Burr Oaks. It is now believed by most ecologists that all land east of the Missouri river would be forest if it wasn't for the Native Americans management techniques. Their main tool was fire. The Burr Oak is a large spreading tree that makes a perfect yard tree. The acorns are the largest in the genus and relatively low in tannins making them a good selection for a nut crop. Hardy to zone 4.

Seedling 1gal-\$9 5gal-\$17

Quercus macrocarpa X gambelli-Burgamble oak

A good hybrid for acorn production on a smaller tree. Trees start producing early when they are only 4-6 feet tall. Very low tannin content. Tree to 40 feet, hardy to -35f.

Seedling 1gal-\$9 5gal-\$17

Quercus macrocarpa x robur-Burenglish Oak

A very fast growing oak up to four feet a year. Annual producers of acorns starting from an early age. Low tannin selection. Hardy to -35f.

Seedling 1gal-\$9 5gal-\$17

Xanthoceras sorbifolia-Yellowhorn or Popcorn shrub

Yellowhorn is a shrub to small tree, 20 feet tall and 8 feet wide. The seeds, about a 1/2 inch in diameter, are edible and taste like crunchy Brazil nuts. They can be eaten raw or cooked in any way. A flour is also made of the nut. The Yellowhorn produces dense clusters of yellow or white flowers with a sweet smell. Yellowhorn grows well on any soil so long as it is well drained.

Seedling 1gal-\$9 5gal-\$15

Vines

Actinidia arguta- Hardy Kiwi

That's right, a kiwi hardy to zone 4. Actinidia is the same genus as the fuzzy kiwi, the kind you can find in grocery stores. The skin of the Hardy Kiwi is smooth, not fuzzy, and you can eat the whole thing like a grape (which it resembles in size). They are delicious... seriously delicious. Like all kiwis, the Hardy Kiwi is a vine and a vigorous one at that, growing from 6-12 feet a year once established. They will fruit in the shade, although yields are greater in the sun. Both a male and female are needed for fruit production and one male can pollinate up to six females. Hardy Kiwis can be grown on a trellis or up a tree as fallen fruit is perfectly edible. Some people will grow

the male up a tree and keep the females to a trellis. They need moist well drained soil. Hardy kiwis also need plenty of water to keep up with their copious leaf and fruit production as one vine generally averages 100lbs of fruit a year! If summer rains are lacking and it is in a dry spot, irrigation will be necessary. Leaves and flowers can not handle frost and will die back if exposed. Generally you lose that years harvest but the plant will recover. Hardy kiwis are relatively pest and disease resistant. Their biggest problem tends to be house cats as they treat the kiwi like catnip. If you have an outdoor cat protecting the kiwis with chicken wire works. The leaves are high in protein and starch and make a good fodder. The kiwi is a great plant to have around. Vines add another dimension to a garden and can be used in so many ways. Be creative, plant a kiwi. We have 9 varieties of *Actinidia arguta*, all propagated by cuttings.

74-46-Large, round, sweet, aromatic fruit. Produces mid season. Vigorous and productive.

Ananasnaja (anna)-Large oval dark green fruit ripens to burgundy in the sun. Leading commercial variety, excellent flavor.

Cordifolia-medium sized sweet round fruits. Not as hardy as others, to zone 5.

Dunbarton oaks- Sweet medium size fruit on a vigorous vine.

Geneva-Very hardy vigorous vine. Large leaved and large fruit (to 1 inch diameter). Later ripening.

Issai-Probably a cross between *A. arguta* and *A. kolomikta*. A monoecious self-fertile plant. Less vigorous and productive. More productive when pollinated with a male. Less hardy-to zone 5. In hot summer regions prefers part shade.

Kens red- A cross between *A. cordifolia* and *A. melanandra*. Flesh turns red when ripe. Very sweet. Not as hardy, to zone 5.

Meader- Our male *A. arguta*. Will pollinate all female vines. Hardy to zone 4.

Michigan State-Large fruit of very good quality. Found growing at Michigan State University. Hardy to zone 5.

119-40b- Self fertile selection that will pollinate other females. Vigorous plant with large leaves. Hardy to zone 5.

Actinidia Kolomikta-Arctic Beauty Kiwi

All members of the *Actinidia* genus are native to northern China, Siberia, and Japan. The Arctic Beauty is less vigorous than most in the genus (10-18 feet) making it a good vine for small places. It is also less productive of fruit than *A. arguta* producing around 25 lbs of fruit per vine. Like all members of the genus *Actinidia* the fruits are loaded with vitamin C and minerals. It will fruit well in the shade and some say this is the only place to grow it. Arctic Beauty is very cold hardy to -40f. The .75" diameter smooth skinned and emerald green fruits are very high quality. Arctic beauty is often grown as an ornamental as its leaves are trifoliate with pink white and green foliage. We offer one male variety and one female variety both propagated by cuttings.

Arctic Beauty-male *A. kolomikta*. Especially striking foliage. Will pollinate all *A. kolomikta* vines. Hardy to zone 3.

Red Beauty-Female *A. kolomikta*. Hardy to -40f.

Well established 6-8foot vines-\$12
Vines 'tipped' and spreading laterals-\$21

Vitis spp.-Valiant Grape.

Sweet blue grape good for table, juice, or wine. Very hardy to -50f. Ripens August to early September. Flavor is very good. Our plants are propagated by cutting.
5gal-\$12

Groundcovers

Arctostaphylos uva ursi-Kinnikinnick, Bearberry

The name 'Bearberry' comes from the fact that bears enjoy eating the small fruit. The fruit is rather insipid and mealy raw but when cooked sweetens up. It is a good source of carbohydrates. Uva Ursi is a small shrublet to 4" high found growing in sandy or even gravely open woods. It is very hardy (to zone 4) and drought tolerant shrublet. Tolerates full sun or light shade. Good for steep slopes as its roots spread and stabilize soil. The leaves, stems and fruit are used medicinally. They are strongly antibacterial. A yellowish-brown dye is obtained from the leaves.

Seedling 1gal-\$8

Asarum canadense-Wild Ginger

Native groundcover to 4" high found growing in woodlands. Fast growing and tolerates poor soil. When bruised the stems smell of ginger. The roots can be grated and used as a ginger replacement. Beautiful kidney shaped leaves.

Cutting 1gal-\$8

Gaultheria procumbens-Wintergreen

Native stoloniferous shrub to 6". Dark green leaves with bright red fruit that can persist all winter. The fruits are the original source of oil of wintergreen which is now mainly produced from the sweet birch (*Betula lenta*). The young leaves are edible and a tea can be made from the stems, leaves and or fruit. Prefers a well drained soil and partial shade. Great to plant under a fruit tree.

Seedling 1gal-\$8

Gaultheria shallon-Salal

West coast sister of our native wintergreen. Drought and shade tolerant shrub to 2-4 feet. Doesn't have the same wintergreen flavor fruit, more juicy and sweet. Produces copiously.

Seedling 1gal-\$8

Rosmarinus officinalis-Arctic Pink Rosemary

Growing to 12" and spreading by rhizomes, the Arctic Pink Rosemary is a great groundcover for wet sites. Will also grow well in drier soils. Hardy to zone 3.

Cutting 1gal-\$8

Rubus stellarictus-Groundcover Raspberry.

Growing to 5” tall and spreading by rhizomes this raspberry makes a great groundcover. Produces raspberries midsummer in full sun or part shade. Extremely hardy to zone 1. We offer cuttings of four varieties; Anna, Beta, Valentina, Sophie
1gal-\$9

Symphytum officinale-Comfrey

A vigorous herbaceous perennial, comfrey can be cut back for mulch several times in a growing season. Being a dynamic accumulator extraordinaire the leaves of comfrey are loaded with potassium, phosphorus, calcium, iron and magnesium. One plant per square meter in an orchard or nuttree will concentrate and make available to other plants enough of the minerals mentioned above to maintain fertility indefinitely. A true must-have for any sustainability minded human. Comfrey makes the perfect complement to any fruit or nut tree as it competes well with grass and, through its tap root, accesses a different soil horizon than the crop tree. Comfrey leaves and roots are used medicinally. Apply the leaves as a poultice on any cut (make sure to squeeze out the juice of the leaves into the cut. If not the comfrey may heal the outside and seal off the inside to fester.) Apply the root as a poultice to any bruises or sprains, it is especially good for bones and a tea can be drunk to stimulate healing. The leaves can be eaten steamed (in moderation). Good bee plant.. Hardy.

Root cutting 1gal-\$5

Vaccinium macrocarpon-Cranberry

This is the lowbush cranberry found growing on raised soil in bogs etc. Grown in an industrial setting over a large area in central WI. No one has more control over their crops environment then the industrial cranberry grower. Thankfully for home gardeners such control is unnecessary to obtain a good crop. Cranberries need acid, moist but not saturated soils. Can be grown on upland soils. Plants reach a mature height of 8-10”. They will spread outwards to form a dense mat. Fruit is wonderful cooked or made into preserves and is very high in minerals. We offer four varieties: Ben Lear, Stevens, Pilgrim, and WSU.

Cutting 1gal-\$8

Vaccinium vitis-idaea-Lingonberry

Lingonberries are relatives of the blueberry and cranberry. They have been cultivated in Scandinavia for many centuries. Plants reach a mature height of 12-18” and should be planted about that distance apart. The fruit is wonderful cooked or made into a preserve and is very nutritious. You can expect to yield about 1-1.5 pounds of fruit per plant. We offer two cultivars: Regal and Red Pearl.

Cutting 1gal-\$8

Flowering Shrubs and Such.

Calycanthus floridus-Spicebush, Carolina Allspice

The Carolina Allspice is a deciduous shrub 3-10 feet tall. It is found growing in woodlands. The bark, wood, roots, shoots and leaves all smell strongly of allspice and can be used as a cinnamon substitute. The flowers are reddish-purple and are strawberry scented. Truly a beautiful shrub with lovely fall color

Seedling 1gal-\$9 5gal-\$14

Camaedaphne calyculata-Leather Leaf

Great insectory plant producing masses of white flowers in very early spring. Grows well in any soil thriving in very wet spots or dry ones.

Seedling 1gal-\$8 5gal-\$15

Caragana arborescens-Siberian Pea Shrub

The Siberian Pea shrub is a nitrogen fixing deciduous shrub growing to 16-20feet tall and 13 feet wide. It can be kept small by pruning. The prunings are high in nitrogen and make good mulch. The young seed pods are edible cooked but so small that it is better to let the chickens eat them. In fact *Caragana arborescens* makes a great chicken fodder plant, watch as the birds leap to devour every last seed. Its extensive root system makes it a good soil stabilizer. *Caragana* grows quickly in any well drained soil. They tolerate drought and full exposure to wind. *Caragana* makes a great windbreak and privacy hedge.

Seedling 1gal-\$6 5gal-\$13

Cephalanthus occidentalis-Honeyball bush

Another great insectory plant. Large globes of white flowers cover the plant in early spring attracting butterflies, hummingbirds, and insects. Seeds are happily eaten by birds including ducks and chickens. Grows well in any location including heavy clay and poorly drained soils.

Seedling 1gal-\$8 5gal-\$15

Cymbopogon citratus-Lemon Grass

Certainly not a plant for the out of doors. Lemon grass grows well in a container and makes a lovely house plant. The leaves smell strongly of lemon and are used to flavor many a dish in our house. A tea can also be made from the leaves. A great source of vitamin C.

Division 1gal-\$8

Daphne spp.-Carol Macke Daphne

Daphnes are low growing shrubs with very sweet aromatic flowers. Great to plant along a path. Attracts butterflies. Carol Macke is a variegated selection growing to 3ft high by 5ft wide.

Cutting 1gal-\$9

Maclura pomifera-Osage Orange

The 'Osage' part of *Maclura pomifera's* common name comes from the Osage Indians who used the strong flexible rot resistant wood to make bows. The 'orange' part of the name comes from the very large round fruit that some people say is poisonous and some people eat. The Osage Orange, along with the American persimmon and Paw paw, is an anachronistic plant. That is, they are making fruit (seed propagules) to attract animals that no longer exist (megafauna). When the megafauna were around (a mere 10,000 years ago) the Osage Orange was widely distributed across Eastern North America. Today Osage Orange is 'native' to a small region in Oklahoma and northern Texas. Thanks to the new 'megafauna', humans, Osage Orange is experiencing a renaissance. Osage Orange grows well on any well drained soil, is drought and wind tolerant, and can be formed to make an impenetrable thicket. A fence that no bull could run through, no horse could jump over and no pig could find his way through. Hey a fence that makes bows, firewood, animal forage, weird oranges and is great habitat for beneficials!

Seedling 1gal-\$8 5gal-\$14

Mahonia aquifolium-Oregon Grape

Found growing with Salal in the understory of mixed conifer forests of the west. A woody shrub to four feet, Oregon grape will grow well in any acidic well drained soil. Drought tolerant. Very medicinal. The roots are used as a tonic and blood purifier especially good for the liver. Produces copious black berries that are tart and reasonably tasty. Can be eaten raw or cooked. A wine is sometimes made with them. Hardy to zone 5.

Seedling 1gal-\$9

Syringa spp.-Lilacs

Densely growing, long-lived, flowering shrubs to 12 feet. Makes a great hedge. Grows well in all well drained soils even clay. We offer three species to extend the flowering season. Hardy to zone 4.

Syringa josikaea-Hungarian lilac

Syringa oblata-Early lilac

Syringa villosa-Late lilac

Seedling 5gal-\$11

Yucca spp.-Yuccas

Two very hardy yuccas, to zone 3. Small evergreen shrub with sword shaped leaves. Roots are rich in saponins and used as a soap. A root chunk is macerated and put in water activating the saponins. Makes good cordage. Needs very well drained soil.

Yucca filamentosa-Adams needle Yucca

Yucca glauca-Great plains Yucca

Division 1gal-\$9

Trees

Acer saccharum-Sugar maple, Hard maple

Good dynamic accumulator of potassium and calcium. Best known sap producing tree. Valuable timber. Shade tolerant forest tree needing well drained acid soils.

Seedling 1gal-\$7 5gal-\$18

Alnus rubra-Red Alder

Fast growing nitrogen fixing tree. Native to western North America. Great nurse tree as it provides atmospheric nitrogen and casts a light shade. The freshly cut wood is often used for mushroom propagation.

Seedling 1gal-\$8 5gal-\$15

Betula lenta- Sweet birch, Cherry birch

The common name 'sweet birch' comes from the fact that *Betula lenta* is the best birch to tap for its sweet sap. The common name 'cherry birch' comes from the quality of the wood which closely resembles our native cherry- *Prunus serotina*. I suppose then it also could be called wintergreen birch as an essential oil is made from the bark that passes for wintergreen oil. Multifunctional birch grows well in most soils to 80ft. It is hardy to -35f.

Seedling 1gal-\$9

Fraxinus americana-White Ash

Generally found growing in the company of Beech, Birch, Maple, and Basswood. White Ash is demanding of sun and fast growing. The wood is valued for its strength, lightness, and right amount of flexibility. The wood is used for many specialized purposes. The best baseball bats are made from White Ash. A beautiful shade tree with bronze autumn color.

Seedling 5gal- \$15

Gymnocladus dioica- Kentucky Coffee Tree

Fast growing disease and pest-free hardwood. Grows well on most soils. Seeds can be roasted and ground and used as a coffee substitute. Rot resistant wood.

Seedling 1gal- \$9 5gal- \$15

Juniperus virginiana- Eastern Red Cedar

Beautiful conically growing evergreen to 100 feet. The birds will tell you that this conifer is no Cedar but rather a Juniper. Listen as they gobble down the blue fruits produced en masse. Will grow just about anywhere. A tough drought tolerant pioneer as well as a shade tolerant late succession species. Beautiful, aromatic, and rot resistant wood. Hardy to zone 4.

Seedling 1gal- \$9

Larix laricina- Tamarack or Larch

Native deciduous conifer found in boggy areas. Rot resistant wood is coffee colored. Grows farther north than any other North American tree. Indians used the roots for sewing strips of Birch bark for their beautiful canoes. Sap is reported to be a disinfectant.

Seedling 1gal- \$8

Maackia amurensis- Amur maackia

Beautiful fast growing shade tree to 60 feet. Nitrogen fixer. Grows well in most soils with full sun.

Seedling 1gal- \$8 5gal- \$15

Metasequoia glyptostroboides- Dawn Redwood

The Dawn Redwood is the most ancient tree in the world. Thought extinct until the 1940's when a grove was found in a remote valley in China. Grew extensively around the world 100 million years ago. Its very pyramidal shape comes from when it grew on continents that were poleward, its shape taking advantage of the low sun angle. The climate was much warmer then. A deciduous conifer, the Dawn Redwood is fast growing in any soil including wet soils, is wind tolerant, coppiceable, and pest and disease free. Beautiful feathery foliage is red and gold in the spring, bright green in the summer, and turns a rich bronze in the fall. The wood is red and aromatic. It is also one of the most rot resistant woods we know of. Plant a grove of Ginkgo, Magnolia, Walnut, and the Dawn Redwood. Look out for a herd of Brontosaurus!

Seedling 1gal- \$9 5gal- \$17

Pinus strobus- White Pine

Our native White Pine. Early succession species as the seedlings need sunlight and disturbed earth to germinate. Incredibly important early timber tree. It was said that a squirrel could live a squirrels lifetime and never get down from a White Pine. Early land-lookers reported vast and pure stands of even-aged White Pine up to 150 feet tall (one specimen in New Hampshire was measured at 240 feet). Age of the trees in the stands corresponded neatly to first European contact. Surrounding the pines were gamepark forests of primarily nut trees (Oak, Beech, Chestnut, Walnut, Pecan, Hickory,...). On the edges copious fruit grew. Hmmm. Grows straight through a central leader. Counting the whorls of branches can give you a good idea of the age of the tree.

Seedling 1gal- \$7

Robinia pseudoacacia- Black Locust

Ahh, the Black Locust. Multiple use plant extraordinaire. Fast growing pioneer to 100 feet. Grows well on any well drained soil. A great green manure tree as it fixes more nitrogen than any other temperate forest tree (up to 590 lbs/acre/year). Dynamic accumulator of potassium, phosphorus, and calcium. Trials have proven

increased growth of crop trees when interplanted with Black Locust. Long compound leaves cast a light shade and are good forage being high in protein. The leaves have numerous insecticidal properties including against the Colorado Potato Beetle. Mulch you potato bed with black locust leaves. The cooked seeds and young pods are edible the latter being a good animal forage. Copious sweetly scented yellow flowers are born in spring and make an excellent bee forage. While they are young they are edible and delicious. The dried flowers are used as a spice. Excellent firewood, putting out the same amount of BTU as coal. Wood is very hard, heavy and strong. Very rot resistant. Rated to 60 years in the ground and 1500 years in a permanently humid environment like a greenhouse!

Seedling 1gal-\$7 5gal-\$15

Salix alba-White Willow

Fast growing in moist soils. Good soil stabilizer and windbreak/privacy screen. Bark can be chewed or made into a tea to relieve pain as it is the source of salicylic acid (aspirin). Great basketry plant. Can be coppiced or pollarded every year to get long straight whips. We offer a rooted cutting of the species and several selections brought back from a basketmakers farm in France. Species hardy to zone 4. The selected cuttings have experienced -20f in our nursery and are thriving.

Selected basketry cutting 1gal-\$6

Species 1gal-\$5 5gal\$11

Thuja occidentalis-Arbor-vitae, Northern White Cedar

Another cedar that's not a cedar. The Arbor-vitae is a native conifer with strongly scented foliage, furrowed bark and a pyramidal shape. Very long lived to 300 years. Often found growing in swampy ground. The new growth is edible and makes a lovely tea. Very high in vitamin C, it was sought after by sailors to cure scurvy. Reported to be the first native American tree to be cultivated in Europe. Brought to Paris in the 1530's by Jacque Cartier.

Seedling 1gal-\$7

Tilia spp.- Basswood, Linden

Native hardwood. Late succession species found growing with Sugar Maple and Eastern Hemlock. Excellent bee plant. Young leaves are tender and delicious making a great addition to any salad. Coppices readily even in the shade. A great way to keep the leaves low enough to reach. Coppice stools are virtually indestructible living for thousands of years. The flowers and young fruits are edible. Apparently eaten together they make a good chocolate substitute. The sap is also edible and reported to be 'chocolatey'. We offer seedlings of three species.

Tilia americana-Basswood

Tilia cordata-Little Leaf Linden

Tilia platyphyllos-Big Leaf Linden

Seedling 1gal-\$8 5gal-\$16

Tsuga Canadensis- Eastern Hemlock

Slow growing late succession species. Seedlings need plenty of moisture and shade. Native usually found with basswood and sugar maple. Not as prevalent these days for a number of reasons, one of them being the increase in the deer population. Deer love hemlock. Very rot resistant wood.

Seedling 1gal-\$8

Ulmus americana- American Elm

Generally the first choice for a shade tree. Some settlers would cut down every tree save for one elm which they would build their house by. Beautiful fountain shape.

Seedling 1gal-\$7 5gal-\$16

Guilds

A guild is a group of organisms (in this case plants) placed in relationships that benefit all and specifically a crop tree. Guilds can help us become sustainable in our own gardens; breaking free from linear systems and creating synergistic cyclical systems. By planting one comfrey plant every square meter around a crop plant we do not have to bring in any amendments save nitrogen. But if we add a nitrogen fixing plant to the guild there is no need to bring in nitrogen. If we place some plants that attract beneficial insects like nasturtium or borage or members of the carrot family then we go a long way towards reducing our pest problem. By breaking free of the clean and linear garden paradigm we can add lots of edge and lumpy texture to our garden creating habitat for beneficials. A small ephemeral pond will bring in frogs that will climb plants and eat aphids. A pile of stones is great habitat for snakes that will keep your rodent population down. Planting a guild goes a long way to creating a cultivated ecosystem where we are stewards and beneficiaries. We offer an ala carte menu for guilds.

- one fruit or nut tree
- one nitrogen fixing shrub
- one comfrey plant or lovage seeds (dynamic accumulator and good in soups)
- enough seeds for around the young plant. Any or all of: -white clover (nitrogen fixer, bee forage, edible)
- fennel and or dill (culinary, insectory)
- borage (insectory, edible flowers)
- nasturtium (insectory, edible flowers)

Fruit tree guild: \$34

Nut tree guild:\$31

Guild of guilds: any two fruit or nut tree guilds with a nitrogen fixing tree: \$76-82.

This allows the gardener to maintain fertility on a broader scale through time.

Gardens

Like any young ecosystem our gardens are yielding an excess of fresh in season annual produce. We also offer fresh eggs for \$3.50/dozen. Inquire in the spring to see what vegetable starts we have. This year we will be raising, for sale, Bourbon

Red turkeys and possibly Muscovy duck. The heirloom turkeys are raised for thanksgiving. Both the turkeys and ducks are pasture raised and eat fresh grass and bugs in a new spot every day. The ducks are incorporated into our aquaculture system having 4 ponds to choose from. This makes the bird happy, the land happy (as the nice scratching and poo are spread about), and you the consumer happy as pasture raised birds are far and away superior in flavor and nutrition to their industrially raised brothers and sisters. Birds must be picked up at the farm. Call to reserve your birds. Check us out this year for yummy veggies, healthy vegetable stats, and birds. Look for us in the future with all sorts of mouth watering fruits and nuts!

Courses

Introduction To Permaculture

In this two day workshop we will cover ethics, principles and design methodology to create a sustainable now. We won't spend any time on rehashing negatives but will focus on grounding people in a paradigm of sanity and empowerment. The workshop will be held at our farm that has been designed utilizing the ethics, principles and design methodology of permaculture. We will explore our design and see first hand how all the systems operate. The workshop will end with groups creating and presenting a permaculture design for a specific site.

When: January 30-31

Cost: \$75 or one day worktrade*

Ecological Agriculture

In this two day workshop we will focus on the agricultural component of the permaculture agenda. Topics will include; forest gardening, aquaculture, integration of systems, animals large and small, water harvesting techniques, terra forming, erosion control, ecology, natural history, indigenous land management techniques, implementation strategies and more. We will look at agriculture with a systems perspective and see how we can design our farms and gardens in the image of an ecosystem.

When: February 20-21

Cost: \$75 or one day worktrade*

Enroll in both courses and receive a 10% discount.^

Raspberry river watershed residents receive a 20% discount.^

^both discounts only apply to the \$75 trade.

*We will select specific days in spring and summer. If either of the dates do not work for someone we can specifically arrange a day with them. Work could prove to be educational and fun!

-Lunch and dinner will be provided, as an option, on both days for both courses. Four dollars is asked for each meal.

Internships

Our internship program is a great way to enmesh yourself into the community and participate in diverse projects. We are looking for self motivated people eager to learn. Interns eat all meals with the community sharing the cooking and cleaning

responsibilities. Essentially it is their home for as long as they are here. The community expects the individual to put at least four days of work a week in on the land. Two of those days will be dictated by the community (generally a group project). The other two days will be self-directed on the condition that the community supports the enterprise. Possible projects are endless. We have had people interested in compost tea, mushroom cultivation, charcoal production for a carbon sink and terra preta, earthen plasters, building woodworking tools such as a shavehorse and a kick lathe and forest gardening. It is also perfectly acceptable for the intern to work with community members on their projects throughout their stay. Priorities for 2010 include; plant propagation (grafting and cuttings), intensive grazing of milk cows, horses and sheep, erecting fences for the livestock, planting-lots of planting, evolution of our aquaculture system, fluffing past plantings, annual gardening, perhaps an earth oven and all sorts of other interesting things that come up. We feel like internships of this kind are the best way to become grounded in real life skills and a holistic/systems epistemology. Think of it as the new age university without the debt. The worktrader is expected to pay for ½ the cost of consumables (food, toilet paper est.) with the community covering the other half. We eat all organic and mostly off the land. We as a community will attempt to facilitate the worktrader in their passions. We hope to create an environment of creativity and productivity.

Design Services

We offer whole system design services on many scales. From a small garden to a large farm including building design and integration. We can go into your project to any depth. Simply a consultation/walkabout to a full scale design. Our rate is \$30/hour. Trades are considered.

Stewards Draw Nonprofit

Stewards Draw is the nonprofit branch of our operation. Steward's Draw owns 240 acres directly to the north of The Draw LLC. It is the mission of Stewards Draw to be a living laboratory continually asking the question, 'How can we live on the land and with each other in abundance perpetually?' To that end we will conduct research in ecological agriculture, carbon sequestration and regenerative land management techniques. Paralleling our efforts in research and demonstration will be our focus on outreach and education. Formal and informal tours, workshops and courses as well as lectures and articles will be the main vehicle to accomplish our outreach goals.

The 240 acres was stewarded by the county prior to its acquisition by Steward's Draw nonprofit. The county left the land in far worse shape than when they found it. Clear cutting and the removal of beaver dams was their focus. Vast monocultures of Balsam Fir and Balsam Poppel as well as copious and ubiquitous erosion are the result of those management practices. The goals of Stewards Draw do not parallel those of the county. Consequently we will act to regenerate the natural capital of the land. Our first priority is in erosion control. The second step will be for selected thinning and planting. It is our goal to create a diverse, resilient and over-yielding polyculture attempting to return abundance to the landscape. Stewarding 240

acres will be a labor and monetary challenge. Volunteers and donations are greatly appreciated. All donations are tax deductible as Steward's Draw is a 501c3 non profit.

Thoughts

I do all I can to be the change I wish to see on this planet. We all make decisions every day that help create our world. It comes down to a simple dichotomy; that of being a beneficial organism or a parasite. Our beautiful and finite planet desperately needs more of the former. Small change is good but not sufficient. Whole changes in epistemologies and lifestyles are needed. Donella Meadows taught that the biggest leverage point to any system is facilitating changes in the systems structure, how it organizes itself. In the human realm, that change in structure is a change in epistemology or world view. To that end I am making available the following thoughts in the hope that they may have some relevance in your life. Thanks.

Towards a Sustainable Epistemology

A riddle if you would like: Why is the world experiencing so much human induced stress if the vast majority of the people you meet are genuinely well meaning and kind? As with most riddles the answer emerges when the question is asked differently. What is the nature of these well meaning and kind people that allows for the creation of so much stress? Another way to look at it would be; what is the structure and organization, process and pattern, feedback and response, of these individuals psyches and their collective, culture. In short in order to understand the problems the Earth is experiencing we need to understand the epistemology, or way of knowing, of the dominant culture. In attempting to understand one type of epistemology we necessarily understand that there is more than one way of knowing. We understand that how we come to perceive, act, and think is created by our experience and our biological circumstances¹. What we see, hear, touch, etc are representations of the actual. Numerous psychological experiments have born out that we see what fits into an existing organization of information. If it doesn't fit we literally will not see it. I have had several interesting experiences that illustrate this point. A friend and I were entering a vehicle. I stepped in and put my folder on the dashboard. As we were driving I would look out one window, turn my head to the front and see my folder on the dash, turn to the other window, turn back forward and see my folder on the dash etc. This went well enough for me until my friend reported with a start that my folder was on the hood of the car! In my paradigm folders rode inside with passengers and I was unable to see the actual, that the folder was on the hood. This is a simple way to illustrate the complex phenomenon of cognition. It is clear that ordinary waking consciences fits the description above. It is

¹ We have a 'front' and a 'back' so we speak of things being 'in front of' or 'behind'. We walk on two legs and thus have a perspective on place and time that a raven might find confusing (of course this distinction is blurring with transportation and communication technologies).

also understood that sometimes information of a different type is allowed through the filter. This new information that does not fit into the pattern of organization of the old, challenges the individual or culture to either create integration or completely reorganize its structure. On the individual level we call this existential crises. On the cultural level we call it revolution². To return to the riddle; if it is our goal to live in harmony with the Earth we need to understand more than the epistemology of the dominant culture. We must also attempt to understand a new way of knowing; a way of knowing that synchronizes with the pattern of organization of biological systems. In this paper I will attempt to work towards an understanding of these two different epistemologies.

Dominant Epistemology

- Environmentalism
- Competition
- Survival of the Fittest
- Organisms Mirroring Environment
- Genetic Determinism
- Cartesian Split
- Linear Causation
- Objective Observer
- Teleological outlook
- Linear Accumulation of Information
- Pity

Ecological Epistemology

- Deep Ecology
- Cooperation
- Survival of the Fit
- Organisms Co-creating environment
- Autopoetic Network
- Embodied Consciences
- Non-Linear Dynamics
- Enmeshed Observer
- Non-teleological Outlook
- Reorganization
- Compassion

Our relation to the Earth, to Gaia, is fundamental to our understanding of these epistemologies. In the dominant culture we see ourselves as separate from nature and talk about resources and wilderness. We call ecologically enlightened thinking environmentalism. Wilderness is defined as a place where humans and their acts don't dominate. We are told to leave only footsteps and take only photographs. The majority of human action would not be classified as 'natural', in fact the more natural something is the more it is separate from humans. By classifying some places as 'wilderness' we allow ourselves to pollute and spoil other places. We see ourselves as something of another kind, something inherently flawed, yet better than nature. Bees and butterflies, oaks and pines, know how to make beauty in nature but humans don't. I believe an ecological epistemology understands that humans and nature are one and the same, made of the same pattern and fabric. Instead of environmentalism we have Deep Ecology and we talk of communities. Humans are seen as beneficial organisms and functional components of an ecosystems organization.

How we understand relationships is an indication of how we will behave towards everything we are related to. In the dominant culture we see the majority of relationships as competition based. Whether we are talking about politics, economics or biology the dominant theme is competition. Resources are seen as the limiting factor. People are encouraged to out compete others in order to succeed. Life is seen as the survival of the fittest. There are tight boundaries that only a few patterns of organization

² See Thomas Khun 'The Structure of Scientific Revolution'.

(organisms, species, businesses, etc.) will squeeze through. What is not allowed is forbidden. An ecological epistemology understands that competition is part of a healthy system. It also understands the dominant quality of relationship is cooperation. Cooperation is ubiquitous; it is everywhere we look, in fact it is what we see. Life would not be possible without cooperation. No organisms can survive in isolation. No organism can photosynthesize and decompose. The apple tree flowering in May depends on its pollinators. It also depends on that junberry flowering in April and the chestnut flowering in June. The apple trees pollinators cannot survive an entire year on two weeks of apple pollen, they require food throughout the year. Most relationships are mutualisms. Just about every plant has associations with fungus and bacteria: the plant fixing carbon in the form of sugar, the bacteria fixing nitrogen and the fungus extracting hard to access minerals and water. Instead of survival of the fittest we have survival of the fit. Broad boundaries with many patterns of organization are allowed. What is not forbidden is allowed. The healthiest social systems embody cooperation. What one person does well another struggles with. Decisions are made with the understanding that everyone carries a piece of the truth and that the outcome will be best when all beings are heard.

Both epistemologies understand that actions have consequences. In the dominant epistemology these consequences are understood to be of a smaller scale than the Earth as a whole. Humans are not capable, it is thought, to affect planetary processes. Organisms are understood to be dependent upon these processes for survival. Organisms mirror the environment. The environment changes and the organism adapts and the species evolves. Natural selection is seen as a slow process whereby ecological and planetary circumstances select aspiring phenotypes. In other words organisms are passive prisoners on spaceship Earth. In an ecological paradigm we understand that organisms have internal coherence and co-create their environment. The Earth itself is seen as one organism living and breathing^{3, 4}. Its organs are the forests, wetlands, and oceans of the world. By the very act of being alive each organism is creating the conditions conducive to life. For example it is estimated that 40% of the rain that falls on the Amazon basin comes from the forest itself. If we were Martians and we were wondering if life existed on the Earth all we would have to do is study the composition of the Earth's atmosphere. Our atmosphere is out of chemical equilibrium. Oxygen is too reactive an element to stay at such a high % in the atmosphere. If it were not for life the Earth's atmosphere and oceans would take on entirely different compositions. Organisms are not passive prisoners but co-creators of Gaia and our actions, for better or worse, can and do have planetary consequences.

It is difficult for most people to conceptualize higher order interactions⁵. Causation is seen as linear. One thing leads to another. An effect is caused by a cause.

³ See James Lovelock, 'Ages of Gaia.

⁴ This brings us to the idea of nested systems or fractals. At every level of organization we find the same pattern. This pattern is an individual entity with internal coherence enmeshed within a larger organization that has its own individual identity. Atom-molecule-cell-organ-organism-ecosystem-Earth. In a very real way 'thou art that'.

⁵ Weather, a conversation, ecological processes, etc.

You kick a stone and you can predict the stones behavior. Someone once said that if he were to be given the position and velocity of all elements in the universe he could predict all future events⁶. This conceptualization leads us to seek the cause of each event (often missing the systemic problems of the system) and to design so as to maximize one yield from a system. An ecological epistemology recognizes that linear causation exists in the universe but that it makes up a very small percentage of all causation. It is understood that the vast majority of systems are non-linear. They are dynamic. If you kick a dog you will not be able to predict its behavior to any level of acceptable certainty. It is the idea that the whole is more than the sum of its parts. No matter how much you know about the parts (you could know every detail) the whole will be unpredictable because the whole emerges from the parts. Gravity emerges from the interaction of two masses; it is not deducible from either mass. The whole displays entirely different patterns than the parts. There is nothing necessarily inherent in the nature of elements⁷ that we should hold them primary in our epistemology. When we shift our thinking from elements to relationships we shift our behavior. When we see relationships as primary we see elements as part of systems. Systems are more than the sum of the elements because of relationships. Only when elements are seen as primary would a system be designed to *maximize* one or several variables⁸. When systems are seen as primary then they are designed to *optimize* variables.

Separation has been a fundamental component of the dominant cultures epistemology for the last three hundred years. We find it both in how we understand humans and nature (see above), self and other⁹ as well as mind and body. We call this the Cartesian split after 17th century French philosopher Rena Descartes. The logical moral consequences that would follow such an understanding are vivisection (dissection of living patients) the creation of abstract resting places (heaven and hell), the believe in the ‘objective observer’ that has no affect on its environment, and the tendency to maximize one yield in any design (as opposed to optimizing) with its consequent ‘side effects’. An ecological epistemology understands that humans are made of the same pattern and fabric of nature and that mind is made of the same pattern and fabric of body. Mind emerges from the structure and relationships of the body just as life emerges from the structure and relationships of macromolecules. Biological

⁶ The assumption here, among others, is that all elements behave as a rock would behave. That is to say that all elements react only in purely physical or chemical ways. A rock is an unenergized system. The only thing that affects it is force (energy). A dog is an energized system (it eats) so it can be affected by information. The information triggers an already energized system.

⁷ By elements we mean ‘things’. A tree, a car, a cloud etc.

⁸ Such as modern agriculture that produces as simple an ecological system as can be imagined by designing to maximize one yield; corn, wheat, soya etc.

⁹ When we see ourselves as separate from others we can pity them. That is we can shake our heads and feel bad for them not understanding. When we see ourselves as made of the same pattern and fabric as others we can have compassion for them. That is we can say, ‘I to have had feelings of anger, hate and rage and am thankful I didn’t act on them as you did.’ You see all possibilities embedded within you.

phenomenon do not transcend physical and chemical phenomenon, they emerge from them. Spirituality and consciousness do not transcend biological phenomenon, they emerge from them. The entire universe is made from the same pattern and fabric. Thou art that.

Many decisions are made on behalf of a goal. Goal thinking is ubiquitous in the dominant epistemology. This is referred to as a teleological outlook. Whether we are talking about religion (the second coming), ecology (climax theory), evolution (humans and their refinement), or politics/societal with its drive towards 'progress' we see time working towards some goal. This leads us to less than desirable behavior as the end justifies the means. Time is embedded in our language with its three tenses: past, present, and future. This gives us a view on life that is a bit like a movie reel with its still shots merging into a moving picture. We can break up the picture and talk about before and after. In reality there is no reel and there are no breaks. Only now exists. Only process exists. There is no goal there is only being. In ecology there is no 'climax community' that nature is working towards. There is only process and the community that exists now has relevance simply because it is. In evolution we are not at the top, we are at the periphery and at the same time the center. All are our brothers and sisters. In religion we are not working towards redemption, redemption is here now! And our societal march of progress is founded on several erroneous assumptions. We are taught in school that all information is cumulative. That we are standing on top of a mountain of compiled information and it is up to us to add to that mountain. All information is of the same kind and fits the same pattern- its accumulation is linear. In an ecological epistemology we recognize that all information is not of the same kind, that some information comes along that does not fit into the existing pattern of understanding, it is of a different kind and it demands attention. The information is either integrated or an entirely new pattern is formed, all of the old information is reorganized and thus becomes entirely new information. As above: at an individual level we call this existential crisis while at the cultural level we call this revolution. The accumulation of information is not linear. There is not one mountain but several hills and you are standing on one of them, you could move to another one or create your own. What I am attempting here is to describe two possible hills and ask you to join me on the one I am calling 'ecological'.

As the dominant cultures march towards 'progress' eats into the twenty-first century many people are questioning its base assumptions. An epistemology founded on separation and competition is being seen for what it is; shallow, arrogant, dangerous and unique to the human species. It has created a culture that is destroying the Earth's regenerative capabilities. This epistemology, or way of knowing, is only one of an infinite number of possibilities. It is imperative that each one of us take a look at her/his believe system. We are loaded down with so much cultural baggage that it is hard to get a good vantage to have a look. I hope that this article can help.

The following was a talk I gave at the Great Lakes Visitor Center in Ashland, WI on April 13 2009. I include it here as an introduction to ecological design.

I want to start by telling you a little bit about our project and myself. My wife Shyam and I moved here two and a half years ago after buying a 265-acre property in the Town of Russell, just north of Bayfield. It is our intention to be the change we wish to see in the world. To that end we are developing the land with abundance, beauty, and sustainability in our hearts and minds. We aspire to be a healthy and productive component of the ecosystem and community. We are attempting to transition about 50-60 acres of the 265 from the intermediate succession thickets and old-field mosaics we found it in to a diverse, resilient over yielding polyculture. Our first two and a half years have been primarily devoted to developing infrastructure. Access, shelter, energy, water, terraforming and some planting have followed extended observation, design and selected clearing. We have started quite productive gardens by sheet mulch not tilling, raised pastured turkeys and eggs for sale, started a for sale nursery (called waters edge nursery and gardens) that is loaded with multiple use species, taught courses in permaculture design and ecological agriculture, established a two and a half acre aquaculture system, planted an acre of land to a food forest, as well as planting several barrier hedges, windbreaks and multiple use polycultures. It is also our intention to be an ecologically and economically viable farm. Several elements whose integration we hope will allow us to reach that goal are; continued pastured poultry, perennial fruit and nut crops, perennial and annual vegetables, honey, medicinals and expansion of the nursery. We are still very much in our infancy. It certainly is a very exciting time in our lives and we hope to share it with anyone who is interested through work trade, course participation and by just stopping by.

I suppose we have been asked to speak here because we are approaching agriculture from a different perspective than the majority of farmers. For me agriculture can take on many faces depending on the perspective we approach it from. I see all possible perspectives on a continuum with modern green revolution agriculture on one end and ecological systems on the other. We could say that on one end we have an agricultural perspective and on the other an ecological perspective. If I were to draw out this continuum agricultural systems like IPM (integrated pest management) and organic agriculture would fall to the middle with organic agriculture approaching an ecological system more than IPM. But I believe that these two agricultural systems, IPM and Organics, are not enough. They are beginning from an agricultural perspective and moving towards an ecological perspective. My primary training is not in agronomy but in ecology, evolution and natural history. I believe that this has allowed me to attempt approaching agriculture from an ecological perspective. I don't believe that we are the only ones attempting to transition our epistemology, or way of knowing, to an ecological perspective. Other local farmers are doing their best to mimic ecological systems on their farms. Perhaps in the not so distant future the state of local agriculture talk will be full of farmers with stories of ecological transitions. The reason we have chosen agriculture as our livelihood and an ecological perspective to approach it from are as follows. We are all dependent on agriculture for our existence. Whether the farmer is in California, New Zealand or Ashland we depend on them for our daily bread. I believe that in the coming years our dependence on local agriculture will grow exponentially. Food traveling from half way across the world will bear the burden of food traveling halve way across the world. We are also all dependent on natural

systems for our existence. Ecosystem services like clean air and water are priceless. The sheer scale, as well as the quality, of our footprint on the planet is compromising the ability of the Earth's ecosystems to function. The majority of our human systems, whether they be political, industrial or agricultural, are linear systems with raw materials at the beginning and waste at the end. They are designed to maximize one or a few variables and 'externalize' both 'waste' and necessary inputs. This is simple to understand when we imagine a modern farm with its vast acreage of monocrop, whether it be wheat, soy, corn or apple trees, that imports its fertility and pest management while exporting its waste as polluted humans, air, water and soil. These linear human systems contrast greatly with ecological systems. Nowhere in nature outside of humanity do we find linear systems. There is no such thing as waste in an ecological system. Waste=food. Ecological systems are cyclical. Instead of maximizing for any one variable Ecological systems optimize variables. That is to say that Ecological systems look at a system in all their yields. With an ecological perspective we see the system as a whole that is more than the sum of its parts and we design for the quality of the whole by optimizing each part. What is an optimum level of a part is that level where the whole will be healthiest. The whole includes more than the commodities it includes the soil the water the air, people and all of our fellow living beings. An ecologically functioning farm would not only provide the purely human services that modern agriculture provides (food, fiber, medicine est.), but also would provide those priceless ecological services like clean air and water. With an ecological perspective we understand that there is no magic land of away, that we can not externalize pollution and expect to remain healthy. Individual health=global health. We also understand that a farm that continues to import necessary inputs, fertilizer, pesticides, est. even if they are organic is unsustainable. An ecologically functioning farm is a tightly cycled farm that creates its own fertility and resiliency. So that then is the charge to any would be sustainable farmer; create a farm that is a self-sustaining functioning ecosystem that creates surplus yield for market. Not an easy task yet a desperately necessary one.

If we are to model our farms after ecosystems we have to understand what an ecosystem is. One simple definition for an ecosystem is; a community of species interacting among themselves and with the physical environment. We must ask ourselves; what is the nature of these interactions? When looked at from the light of the whole or the parts these interactions are understood to be interdependencies. And the interdependencies relate to functions. For example no organism can both photosynthesize and decompose. Cooperation not competition is the basic model of interaction in an ecosystem. For example an Apple tree depends on its pollinators to set fruit. But the pollinators cannot survive an entire year on two weeks of apple pollen so in a very real way that apple tree also depends on the juneberry that is flowering before it and the basswood that flowers after. To model our farm after an ecosystem we must understand all of the functions that a healthy ecosystem performs. Photosynthesis, decomposition, pollination, subsoil mining, nitrogen fixation, predation and herbivory are just some of the functions that we have to incorporate into our agricultural systems. We also must understand how these functions, and the elements that perform them relate structurally and in time. There is a lot to know but nature is a great teacher and we have learned a lot. There is a lot going for an ecological farmer for these

interactions we are talking about are synergistic. This is the idea that the whole is more than the sum of the parts. The behavior of the whole system is unpredictable when we look at the parts alone. No matter how much we know about the parts, we could know every detail, the whole is unpredictable because it emerges from the interactions. For example gravity is a synergistic affect and emerges from the relationship of two masses. It is not deducible from analyzing either mass. Similarly resilience and productivity emerge from ecological interactions. We do not need to know every detail of the parts to create an agriculturally productive ecosystem with excess yield. But we do need to design our lives and our farms mimicking ecological principles and patterns.

So what then would an ecological farm look like. A detailed look is impossible in this format and timeframe but I do want to take a look in more detail at one aspect of our farm. We desire to grow perennial fruit and nut crops on our farm. What is usually done in this regard is that one or a few specific commodities are integrated into the farm in the form of an orchard. It is common to find an acre to 100 acre blocks of land planted entirely to apples. This is a very simplistic ecosystem. One yield is maximized, that of apples, generally no other yields are asked of the system. To maintain these very simplistic ecosystem the farmer must intervene to perform many of the functions that an ecosystem normally performs such as fertilization, pest control, and pollination. These inputs and the waste and pollution they produce are externalized. The orchard system is lineal with the farmer expending unnecessary energy, time and money while the farm ecosystem itself as well as the surrounding ecosystem and planet as a whole experience unnecessary waste and pollution. These problems are related. In fact they are one and the same. The intention to grow perennial fruit and nut crops is actualized in a different manner when approached from an ecological perspective. The commodities; fruits and nuts, are optimized not maximized. Many yields are asked from the system including ecological functions such as fertilization, pollination, pest control and those priceless ecological services; clean air and water. The idea of commodities is expanded as well to include things such as fodder, fuel, fiber, medicine and possibly aesthetic enjoyment; we have you pick berry patches what about you pick food forests. A changing market, informed citizenry, and a sustainable home economy are aspects of the social and economic infrastructure that must parallel a transition to ecological agriculture. Instead of an orchard then we planted a food forest. The acre of land is not a monoculture of apple trees but rather a highly diverse polyculture with over a hundred species of perennial plants as well as annuals that filled our bellies in the warm months and our cellar for the cold ones. The diversity was not strewn willy-nilly over the acreage but was designed carefully to create functional interdependence in both time and space. The function: fertilization was incorporated by planting 30% of the horizon habitat, the habitat that normally includes only apple trees, to nitrogen fixing trees. These trees produce enough nitrogen for their use as well as their neighbors and at that percentage no nitrogen will need to be brought in from outside the system in the long run. In the short run, as all these plants are young and small, we planted nitrogen fixing shrubs about 3-4 feet away from each horizon habitat tree, that is each apple, chestnut, stone pine, oak, cherry, apricot, and quince. These will be trimmed back hard each spring to release a significant quantity of nitrogen into the soil to be taken up by the fruit or nut tree. These shrubs are resilient and grow back well from this culture. These elements,

the nitrogen fixers, serve more than one function; they are also used for mulch, fuel and food as they all have either extremely medicinal fruit or deliciously edible flowers. They also add habitat and food for beneficial insects and animals, attracting and providing for pollinators and pest predators. Nitrogen is not the only element necessary for ecosystem health. We have also incorporated into the system dynamic accumulators also called subsoil miners that drive their taproot deep into the soil bringing up subsoil nutrients such as phosphorus, potassium and calcium. Just replacing the ground cover layer with more herbaceous plants and less grass helps the fruit and nut trees compete better for water and nutrients. A lot of these herbaceous plants also provide habitat and food for beneficials as well as food and medicine for us as those plants rich in minerals are generally medicinal, these include dandelion, dock, comfrey, borage, nasturtium and many many more. The function, pollination is actualized by planting to have flowering plants all through the growing season. This is especially important for farms that are surrounded by monoculture landscapes. This is not only aesthetically pleasing but functional in that it attracts beneficials at all times of the year so you have a standing population ready for any pathogen outbreak or any flowers that need pollinating. The function pest control follows from the previous two functions; fertilization and pollination. Having a diverse and highly interconnected system promotes a healthy and abundant landscape. The element of time is incorporated in the system as well. As we saw earlier designing to have flowering plants flowering through the growing season is an important functional aspect that has a time element. Another element of time that is important to consider is successional time, or the time it takes for fruit and nut trees to reach their mature size. The conditions of your agriculture ecosystem change greatly from the time you plant to when the plants are mature. The timeframe is different for different species and different still for different rootstocks. You could have anywhere between 5 and 25 years of high light availability before the system becomes shady and more forest like. For our food forest we planted every level of succession at once to take advantage of the time element. In between chestnuts, std apples, oaks and stone pines we planted juneberries and plums, dwarf apples, hazelnuts and hawthorns, raspberries, gooseberries, currants and paw paws. As these plants are also small to start we planted strawberries and annuals between them. As the ecosystem matures we will transition our annual agriculture to another younger food forest and to permanent annual gardens. In shadier pockets of the young food forest we have planted nucleuses of multifunctional shade tolerant plants including, wintergreen, salal, oregon grape, uva-ursi, woodland strawberry and hardy kiwi. As the food forest matures these nucleuses will merge to create a multifunctional shade tolerant understory. We are attempting to create more than a self-sustaining low maintenance over yielding polyculture we also wish for our agricultural ecosystem to provide those ecosystem services that we depend upon for our survival. Simply by filling as many niches as possible and connecting the system to more of itself an agricultural ecosystem goes a long way to fulfilling this goal. We have also used the brush we acquired through clearing the thicket that existed before the food forest to stuff fast eroding ravines, build contour dams on the slope and build a brush fence to keep deer out. We have seen a significant change in the nature of the water that leaves our land. Initially the water ran fast and dirty carrying a lot of sediment to the river. Now, after these measures plus some swaling, which is a ditch on

contour, water slows and sinks dropping its sediment load and moving where it should, through the soil. We are building soil in the ravines and on our upland instead of eroding it. We are extending the life of the river below by extending the time that it takes water to reach it as well as cleaning it of sediment. We hope that if others take this approach to the Raspberry river it will return to its pre-settlement condition of a cold, clear and perennial trout stream. All watersheds deserve our consideration. A food forest is so much more than an orchard, it is a functioning component of the biosphere as well as a producer of goods for human consumption. It is a diverse, resilient, over yielding polyculture that is ethically fulfilling aesthetically pleasing and intellectually stimulating.

This then is a small part of the state of local agriculture but a part that is growing and necessarily so. It is up to more than just the farmers to transition their approach to life; it is up to all of us. We all must make decisions in our day-to-day life that enhance ecological processes not depress them. Consumers must make decisions at market that take into consideration more than their pocket book. The bottom line is not the bank account rather it is health. A sustainable local agriculture needs a public that supports a sustainable local agriculture. We all benefit as a healthy farm promotes a healthy planet and healthy people. Approaching agriculture from an ecological perspective we design food forests not orchards. We design meadows and marshes not grain fields or pastures. And we would look at how these different agricultural ecosystems interact with each other, with the surrounding land and with the social and economic infrastructure of the family, community, and bioregion to create that ecosystem we call a farm.

