



# News & Notes of the UCSC Farm & Garden

Issue 128, Winter 2011

## For the Home Orchardist Rootstock Basics

– Orin Martin

*Note to readers: This article complements Scion Basics, Fall 2008 News & Notes, Issue 119, available online at <http://casfs.ucsc.edu/publications> (select the New & Notes link).*

### What Is It?

The rootstock describes the basal portion of the tree, the trunk below the graft/bud union\* and of course the root system. The rootstock is a genetically distinct “individual” from the scion, or bearing portion of the tree. Different species of fruit (apple, pear, plum, peach, etc.) have a number of rootstocks to which scions can be grafted or budded (see rootstocks chart, page 6).

Rootstock choice is probably the most critical and dominant factor influencing the type of fruit tree you’ll end up with, as it influences both tree size and the ratio of tree canopy to pounds of fruit. This is referred to as cropping efficiency. It “rolls” like this: While a bigger tree produces more pounds of fruit, per tree, the dwarf tree produces more fruit per area of canopy. As dwarf trees can be spaced closer together, they out-yield bigger trees on a per-area basis (note that in this article the term “dwarf” also refers to semi-dwarf trees).

### Where Do They Originate?

Similar to scions, rootstocks result from naturally occurring seedlings or chance mutations. They are also the result of conscious breeding programs. After a rootstock, regardless of its origin, has been recognized as having redeeming qualities, it is thereafter reproduced asexually or clonally.

A classic example of a naturally occurring rootstock from antiquity: Alexander the Great, 400 B.C.E., sent back to Macedonia a rootstock found in Persia (now Iran). This apple rootstock was naturally very dwarfing, productive, self-rooting, and thus easy to maintain and propagate. It came to be known as the ‘Paradise’ rootstock (paradise derives from the Sanskrit *paradeca*, meaning garden).

### What Do They Give You?

Rootstocks impart a number of genetic characteristics to the whole tree. These fall largely (but not exclusively) into two broad categories: control and adaptations.

The control issues are –

- Tree size
- Roots/ root system
- Transport
- Yield efficiency (precocity)
- Partitioning of resources
- Longevity

The adaptations are to –

- Soil
- Pests
- Diseases
- Cold (not applicable to mild regions)

*See chart on page 6 for summary of rootstocks and their adaptations*

Rootstocks control overall tree size, from full size (20–30’ tall) to mini-dwarf (3–5’), and have more influence on tree size than do scions. They do this largely by two mechanisms: the roots–root system, and the transport of materials for growth (water, nutrients, and growth regulators).

*continued on page 2*

\*The bud union is the point at the base of the trunk where rootstock and scion are fused together either by budding or grafting. On young trees there is a noticeable swelling at this point owing to the constricting amassing of lignin, a complex chemical compound found in cell walls that acts to stiffen the cell.

The nature, type, extent and function or efficiency of a rootstock's roots and root system are major determinants of tree size: the more dwarfing the rootstock, the smaller the extent of the root system (often only 1–2 square meters versus 10–12 square meters on full-size trees). Keep in mind, fruit trees do not actually have square, but radial root systems that are somewhat asymmetrical. With the exception of a taproot that serves primarily to anchor the tree, most of a fruit tree's roots are shallow, superficial, and fibrous or branched. They generally extend out to or beyond the "drip line," defined as the imaginary circle around the circumference of the tree canopy, i.e., the outer extent of the branches, where rain or irrigation water drips off the leaves and onto the ground. Dwarf rootstocks feature an effective feeding root depth of 1–2', while full-size trees probe 2–3' deep.

The nature of size-controlling, dwarf rootstocks' roots is different from that of full-size trees. They tend to be brittle, constantly breaking off at the feeding tips. They are narrower in diameter (and thus have less conductive tissues) and most notably are less efficient at taking up and transporting water and nutrients to the top part of the tree. These factors, coupled with the roots' limited extent and thus ability to explore and forage for nutrients and water, contribute to the dwarfing effect.

Roots are also winter storage sites for carbohydrates, which are then shuttled to leaves, flowers, fruits, and shoots. These carbohydrates fuel enormous demands in early spring–summer, before the tree can manufacture carbohydrates as a byproduct of early-season photosynthesis. Dwarf rootstocks manufacture and store fewer carbohydrates. In the intra-tree battle for resources, fruit is a huge "sink" and always outcompetes leaves, shoots and roots for resources, causing dwarf trees to grow less and fruit more.

Another manner in which dwarfing rootstocks limit tree vigor has to do with transport of growth-promoting substances (mostly hormones) from roots to shoots and vice versa. Trees have hormone production/synthesis sites, action sites, and a means of transport, from one to the other. Production sites are largely apical meristems—the tips of roots and shoots. When they arrive at action sites, plant hormones—which are highly effective in small quantities—produce large-scale, striking changes. For example, the hormone gibberelin is produced in tree roots and transported to shoots where it spurs shoot elongation.

Basically, with dwarf rootstocks, less of the chemical messages that promote vegetative growth and vigor are manufactured and transported to and from the "antipodes." In essence the tree gets the message: Grow less rampantly, fruit earlier in life and more abundantly as life goes on and, oh yeah, exhaust your reserves and live less long. Granted, this statement is both reductive and anthropomorphic, but nonetheless graphic and true.



Jeff Rosendale

Matthew Sutton gives tips on planting a bare-root, dwarf fruit tree at a public workshop at Sierra Azul Nursery & Gardens.

The actual makeup of transport vessels (xylem—moving water, nutrients, and growth regulators upward, and phloem—moving sugars and growth regulators downward) in dwarf trees features fewer cells, narrow diameter sieve tubes and often both slightly misaligned cells and a constriction or partial blockage of those cells from the production of lignin at the bud union. Again, all this restricts the flow of growth-promoting substances, limiting tree size.

While all of the above is obvious to growers, it has basis in research. Forshey and McKay (Cornell University, 1970) compared carbohydrate (sugars and starches) distribution in dwarf apples (M7 rootstock, 3.1 meters in height) with full-size apples (seedling rootstock, 8.4 meters in height). They found that the smaller trees distributed carbohydrates at a rate slightly greater than 3:1 fruit over wood and leaves. The larger trees allocated resources at a rate that slightly favored wood and leaf production over fruit. Stated another way, dwarf trees allocated >75% of their total resources to fruit production.

#### *Advantages of Dwarfing Rootstock*

With fruit trees, size manageability has its benefits. From a management perspective dwarf trees come into bearing (precocity) early in life (3–5 years), yield more efficiently, and are easier, quicker, and safer to care for. The requisite operations—observation, pruning, training, spraying, thinning, and picking—can be done without the use of ladders (hence the term "pedestrian orchard") and thus accomplished more efficiently.

*continued on page 6*

# mid Winter/mid Spring Calendar

## In-Depth Winter Pruning – Stone Fruits

*Saturday, February 12, 10 am – 2 pm*  
*Louise Cain Gatehouse, UCSC Farm*

Learn how to prune your plum, apricot, cherry, and other stone fruit trees from Orin Martin and Matthew Sutton. Wear warm clothes and bring a snack; heavy rain cancels. \$15 for Friends' members; \$20 general public, \$5 for UCSC students with student ID. *Note: rainout date is Saturday, February 19, 10 am – 2 pm.*

## Fruit Tree Q&A Session

*Saturday, February 12, 3 pm – 5 pm*  
*The Garden Company, 2218 Mission St., Santa Cruz*

Following the Stone Fruit Pruning workshop, Orin and Matthew will lead a free fruit tree Q&A session at The Garden Company nursery.

## Fruit Tree Grafting Workshop

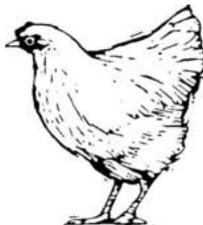
*Saturday, March 5, 1 – 4 pm*  
*Live Oak Grange, 1900 17th Ave, Santa Cruz*

Taught in collaboration with the California Rare Fruit growers, this hands-on workshop will cover the basics of grafting fruit trees. Come "make and take" a fruit tree! \$15 for Friends' members; \$20 general public; \$5 for UCSC students with student ID; free for members of the California Rare Fruit Growers.

## Raising Chickens (& Ducks!) in Town

*Saturday, March 12, 10 am – 1 pm*  
*Louise Cain Gatehouse, UCSC Farm*

Learn how to raise and care for chickens and other poultry in an urban environment. Taught by Paul Glowaski, co-founder of "Urban Eggs," this workshop will cover the basics of tending small flocks in town, including coop design, breeds, and disease and predator control. Bring a snack. \$20 for Friends' members; \$25 general public; \$5 for UCSC students with student ID.



## “Garden Cruz” Gardening Intensive

*Saturday, March 19 – Saturday, March 26, 9 am – 5 pm*  
*Alan Chadwick Garden and UCSC Farm*

The first ever 8-day organic gardening intensive offered by staff of the Farm & Garden Apprenticeship and invited experts. This spring intensive is an ideal program for students and community members involved in campus and community gardens, or looking to enhance their ability to grow food at home. See page 4 for details.

## Starting Your Garden from Seed

*Saturday, April 2, 10 am – 1 pm*  
*Louise Cain Gatehouse, UCSC Farm*

Gardening instructor Trish Hildinger leads this lecture and hands-on class designed for beginning and intermediate gardeners who want to learn how to start vegetables and flowers from seed. Wear comfortable shoes and bring a snack. \$15 for Friends' members; \$20 general public, \$5 for UCSC students with student ID.

## Bees and Beekeeping

*Saturday, April 16, 10 am – 1 pm*  
*Louise Cain Gatehouse, UCSC Farm*

Learn the basics of honey bee natural history and beekeeping from James Cook of Meder Street Farms. Wear comfortable shoes and bring a snack. \$15 for Friends' members; \$20 general public, \$5 for UCSC students with student ID.

## Top 10 Herbs to Grow in an Herb Garden

*Saturday, April 23, 10 am - 1 pm*  
*Louise Cain Gatehouse, UCSC Farm*

Join Western/Chinese herbalist and licensed acupuncturist Darren Huckle to learn how much you can do with just a few herbs. Darren will discuss how to grow, prepare and use 10 great medicinal plants. Wear comfortable shoes and bring a snack. \$15 for Friends' members; \$20 general public, \$5 for UCSC students with student ID.

*If you'd like more information about these and other upcoming events, need directions, or have questions about access, please call 831.459-3240, email [casfs@ucsc.edu](mailto:casfs@ucsc.edu), or see our web site, [casfs.ucsc.edu](http://casfs.ucsc.edu).*

*For a complete list of 2011 events, see [casfs.ucsc.edu](http://casfs.ucsc.edu)*

*Please note that except for the Garden Cruz intensive, we cannot accept credit card payments for classes or merchandise (cash or check only). No pre-registration or reservation required for workshops, unless noted. UCSC student participation supported by UCSC's Measure 43 funding.*

*Co-sponsored by the Center for Agroecology & Sustainable Food Systems at UC Santa Cruz, and the Friends of the UCSC Farm & Garden.*

## ***“Garden Cruz” Gardening Intensive, March 19 – March 26***

The first ever 8-day organic gardening course offered by staff of the CASFS Farm & Garden Apprenticeship staff and invited experts will take place from Saturday, March 19 through Saturday, March 26 from 9 am–5 pm daily at the Alan Chadwick Garden and UCSC Farm.

In response to requests for a more in-depth gardening course from many of those who attend Friends of the Farm & Garden workshops, the Friends board of directors, CASFS Apprenticeship staff, and UCSC’s Recreation Department have teamed up to offer “Garden Cruz.” This 8-day intensive class will combine lectures, demonstrations and guided hands-on practice. The program is intended to serve those who can’t take six months out of their lives to attend the Apprenticeship yet seek the skills and resources required to turn a bare patch of earth into a thriving vegetable garden, stocked with healthy transplants and an efficient and functional irrigation system. This is an ideal program for students and community members involved in campus and community gardens, or looking to enhance their ability to grow food and flowers at home.

Topics covered will include: compost and compost making (including worm composting); an introduction to soils and soil assessment; preparing and planting garden beds; information on and care of various vegetable crops, flowers, and fruit trees; propagation from seeds and cuttings; transplanting; irrigation; controlling pests and diseases; and an introduction to bees and beekeeping.

Cost of the 8-day course is \$495 for community members and \$295 for UCSC students. Read more about the class and sign up via the UCSC Recreation Department’s website, [www.ucsc recreation.com/catalog/?offering=929](http://www.ucsc recreation.com/catalog/?offering=929). Space is limited. If you have any questions, call 831.459-3240 or email [casfs@ucsc.edu](mailto:casfs@ucsc.edu). UCSC student participation is supported by UCSC’s Measure 43 funding. Note that the Friends are also planning a weekend- and evening-based gardening intensive course for Fall 2011; stay tuned for details.

## **Save the Date for the Spring Plant Sale!**

Please note that this year’s Spring Plant Sale will take place Saturday, April 30, from 10 am–3 pm and Sunday, May 1, from 10 am–2 pm. Friends’ members have “early entry” priority on Saturday from 9 am–10 am. Look for details in the next issue of the *News & Notes*.



## **New Friends’ Board Officers Selected**

At its October annual meeting, the Friends’ membership approved a new slate of officers along with several bylaw changes.

Heading the Board this year is Daniel Paduano. Daniel was a member of the 2006 Apprenticeship in Ecological Horticulture class. After graduating he and his wife Nancy started Abounding Harvest Mountain Farm ([www.aboundingharvest.com](http://www.aboundingharvest.com)) in the Santa Cruz Mountains, specializing in fruits and summer vegetables. Matthew Sutton has moved from President to the role of Vice President. Matthew graduated from the Apprenticeship, is the founder of OrchardKeepers, an organic orchard care business, and teaches a number of the Friends’ fruit tree workshops. Photographer, writer and editor Tana Butler stays on as board secretary, and Don Burgett, also an Apprenticeship graduate, will retain his role as treasurer. Many thanks to outgoing co-president Kurt Christiansen and vice president Erin Justus, who will remain active as board members.

Here are some thoughts from Daniel about last year’s activities and upcoming projects:

“With the help of our membership, the Friend’s board of directors was able to provide scholarships for Apprentices from the United States and abroad. We put on a host of successful events, classes, and workshops, culminating in the Harvest Festival. Additionally, we continued to maintain and improve the facilities on the UCSC Farm and in the Alan Chadwick Garden for last year’s class and for generations of Apprentices to come.

This year marks the first that Apprentices have had permanent housing on the UCSC Farm, following last year’s successful push to complete nine Tent Cabins with four rooms each. The outdoor, solar showers were improved in this process as well. The floor of the Farm Center was refinished, and a new, safer and more efficient oven was installed.

Funding from the Friends supported a new, ninety-six foot long “high tunnel” in the handworked Garden at the UCSC Farm to help extend the growing season. The Friends also commissioned a beautiful redwood bench, installed in honor of our great farm manager, mentor and friend Jim Leap, who moved on this year to pursue agricultural research intended to improve the sustainability of organic farming systems worldwide.

It is with great excitement that we look forward to the growing season ahead. We have put together our strongest program of classes for the community to date, beginning with our Fruit Tree Series. In addition to some traditional favorites, we are adding the “Garden Cruz” course, workshops on herbs taught by Darren Huckle, and a cut flower class taught by Orin Martin. We hope you can join us.”

*See [casfs.ucsc.edu](http://casfs.ucsc.edu) for details on upcoming events.*

# The Gardening Seasons of Santa Cruz

— by *Orin Martin*

## *Santa Cruz Spring — March 15 - May 31*

This time of year reminds us of why we live in Santa Cruz. Usually by the middle of March, the pattern of winter storms abates, giving rise to warm sunny days with daytime temperatures in the 60°s and 70°s and nighttime temperatures in the mid to upper 40°s and low 50°s. Rain usually comes in the form of moderate to gentle spring showers.

In a mild climate such as ours, it has always seemed that we should be able to harvest more than we do from our gardens in the spring, but in truth these months are some of the year's slimmest. Overwintered brassicas, root crops and leaf crops have either been harvested, succumbed to the cold, long wet stretches of January and February, or bolted in reaction to spring's lengthening, warming days.

As the soil warms and dries, gardeners can turn their pent-up energy lose on bed preparation and sowing. Late March into April are prime dates for planting cool-season leaf crops—spinach, arugula, and salad mixes—directly in the garden, along with root crops such as beets, carrots, radishes, and turnips. March and early April are among the premiere dates for sowing peas, be they the delectable snowpea, the “eat the whole thing” snap pea, or the yeoman-like pod pea. Although peas are a “whole lotta vine” and only a handful of pods at harvest time, they still rank as worthwhile on a garden scale.

Spring also offers perfect lettuce-growing weather, and is the time to transplant starts of kale, chard, leeks, scallions, and the unsung and under-appreciated Asian greens. Late spring (May–June 1) opens the door for sowing warm-season crops—beans, corn, and transplants of pumpkins, winter and summer squashes, tomatoes, eggplants, and peppers.



Summer crops for sale at the Farm & Garden Market Cart.

## *Santa Cruz Summer: Phase One — June 1 - August 15*

Usually coincident with Memorial Day, that dense, heavy mound of air we call the “Pacific High” parks itself off the coast of Central California. The exact strength and position of this dynamic air mass are principal determinant of our early summer weather. If the Pacific High is large and stationed close to the coast, we have long bouts of fog punctuated by cool, sunny days. If the air mass is minimal and positioned farther south, Santa Cruz can have a warm, sunny June and July.

This time of year sees the results of our spring labors, with bountiful harvests of beets, carrots, leafy greens, and peas. July sees the first of the bush beans for the kitchen larder and in most years, garlic lives up to its name as “Holiday plant”—planted around Thanksgiving, offered supplemental fertility on Valentine’s Day and St. Patrick’s Day, a withholding of water around Memorial Day, and harvest on (or around) Independence Day. Onions follow the same annual cycle.

## *Phase Two — August 15 - October 15 (and sometimes through Thanksgiving)*

These months, which are characterized by the warmest air, soil, and water temperatures of the year, make up our true summer. The fog abates and daytime temperatures climb into the 70°s and 80°s, with several episodes in the 90°s and an occasional day topping 100°. In a good year, tomatoes, peppers, corn, beans and even eggplants will begin to grace our kitchens in early August. In cool years, September and October share these hallmarks of the summer season.

One of the bounties of our Mediterranean climate is that we can grow the cool-season crops in amongst and at the same time as the warm-season crops. As unlikely as it seem, late July through mid September is the time to establish a foundation for the fall–winter garden (fall–winter implies the time of harvest, not the time of planting). Transplants of broccoli, cabbage, and other brassicas set out in August–September will grow to large plants that yield big, sweet heads in October–January.

In Santa Cruz, the ground acts as a refrigerator as the weather cools in late fall. Root crops such as beets and carrots sown in August–September will keep in the ground and can be harvested along with leeks, scallions, and green garlic through late winter into early spring. Winter lettuce transplants can be set out by mid October for winter harvest.

## *The Progression of Summer Fruit*

Late June to early July usually heralds the first of the Japanese plums—Santa Rosa, Mariposa, Satsuma, and others. These plums are slightly acid over sweet in taste and

## News & Notes

### Apple Rootstocks

Type	Height	Other Characteristics and Features
<i>Semidwarfing</i>		
MM 111	15–20 feet	Adapted to a variety of soil conditions; tolerates drought. Rootstock has fibrous roots—produces a heavy-bearing, well-anchored tree. Excellent for spur-type cultivars.
M 106	14–18 feet	Adapted to a wide range of soil temperatures. Should not be planted on poorly drained soils
M 7	11–16 feet	One of the most popular rootstocks. Exceptional winter hardiness; performs best on deep, fertile, well-drained soils that retain constant moisture. Susceptible to woolly apple aphid; moderately resistant to fire blight. May lean with heavy crops on windy sites—advisable on such sites to support lower trunk to a height of 3' in early years.
<i>Dwarfing</i>		
M 26	8–14 feet	Roots well and better anchored than M9, though still needs support. Very productive and early bearing; recommended for use on all but badly drained soils. Rather shallow-rooted—careful attention must be paid to irrigation management.
M 9	8–12 feet	Very precocious with high yield efficiency; susceptible to fire blight and woolly apple aphid. Most extensively planted rootstock worldwide.
Mark	8–10 feet	Very precocious with high yield efficiency. Trees on Mark require support to produce a full-canopied tree. Extremely hardy, tolerates numerous soil types. More resistant to fire blight than M 26. Heavy bearing in early years stunts tree—thin fruit to avoid.
<i>Extremely Dwarfing</i>		
M 27	4–6 feet	Very precocious with high yield efficiency. Requires support. Less susceptible to fire blight than M 9 and M 26. Well suited for growing in a container or a small yard. Fruit should be thinned or removed for the first year or two to encourage growth. Very exacting—requires frequent inputs of water and nutrients because of restricted root system.

### Stone Fruit Rootstocks

Type	Height	Other Characteristics and Features
Lovell	>15–20'	Seedling rootstock compatible with all peaches, plums and some almonds and apricots. Susceptible to root knot and root lesion. Susceptible to oak root fungus, crown rot, bacterial canker. While it good drainage, it tolerates wet soils better than other peach stocks.
Nemaguard	>15–20'	Compatible with peaches, plums and some nectarines. Resistant to root knot but not root lesion nematodes.* Susceptible to oak root fungus, crown rot, bacterial canker. Avoid wet soils. Likes well-drained loams.
Citation	10–15'	Semi-dwarf, compatible with peaches, nectarines, plums, apricots, pluots, and apriums. Resists root knot nematodes. Susceptible to oak root fungus, crown rot, bacterial canker. High tolerance for wet soils, not drought tolerant.
Marianna 2624	10–15'	A plum rootstock that can be used for some almonds and apricots, but not peaches, nectarines. Pest susceptibility unknown. Moderately resistant to oak root fungus, crown rot. Susceptible to bacterial canker. Does very well in wet soils and tolerates a variety of soil types, including heavy soils.
Krymsk1	8–12'	Semi-dwarf, a plum stock. Imparts precocity to peaches, nectarines, plums, apricots. Pest and disease susceptibility unknown. Grows well in heavy soils with drainage issues.

### Pear Rootstocks

Pears tolerate wet soils better than most other fruit trees. Most pears are subject to fireblight (a bacterial disease). There are no effective, truly dwarfing rootstocks for pears. The pyrodwarf series reportedly keeps pears at 6–10', although my experience with it is 10–15'. This rootstock does not promote heavy fruit set and is somewhat susceptible to fireblight. It is weak rooted and intolerant of water fluctuations. Plus it's almost impossible to source. But other than that it's great.

Winter Nella, Betulaefolia, Calleryana, Bartlett Seedling	25–40'	Don't even think about it. These are monstrous trees that can take 5–8 years to even begin fruiting.
Old home Farmingdale 333 and 513 (they perform similarly by 513 is slightly more precocious)	10–18'	These rootstocks are about as semi-dwarf as pears get. An exception: the variety (scion) Seckel, which produces a naturally dwarf (6–8') tree on old home rootstocks. Resists woolly apple aphid. Resists collar rot, pear decline. Tolerates wet, heavy soils.

\*Nematodes are microscopic, non-segmented worms that infect roots of stone fruits that either compromise growth or kill trees. They are mostly a problem in warm inland situations with clay soils.

By growing fruit trees on dwarfing rootstocks the home gardener can fit more trees into a small area, and thus grow a wider variety of fruit, grow a size-manageable tree that is easier and safer to care for, and start eating fruit sooner after planting than with standard-size trees.

### Addressing Trees' Needs

As a general rule, fruit trees do not produce fruit until they are physiologically mature and all of their structural needs (roots, wood, leaves) have been met. At that juncture they then allocate resources to fruit production. With dwarf trees, there is less wood structure and root mass to establish, so they more quickly reach the fruit production stage.

The home gardener can aid tree establishment and early fruit production by being attentive to irrigation and fertilization. The goal with young trees is to double the canopy size from planting through year 1—and then to double that size in year 2. If the above is in order, the dwarf tree should produce a light crop in years 3 and 4 and achieve full production in years 5–8.

At no time should a young tree go through water stress (water deficit). This is particularly true of dwarf trees: because of their restricted and less efficient root system, water needs to be applied more frequently and less deeply than on a full-size tree.

In general—and not just with young trees—a fruit tree's greatest nutrient demand period is in early spring (approximately the spring equinox) through early summer (summer solstice). This is the time when roots grow the most, shoots extend (they shut down in mid summer), and resources are needed for flowering, fruit set, and fruit sizing. Additionally, nutrients are required in this period to manufacture *next year's* flowers internally.

The upshot of all this is that trees need nutrients as early in the growing season as possible, and with dwarfing (less efficient) rootstocks this is paramount. The emphasis for fruit tree fertilization is on nitrogen. Any granular/meal-powder source of organic fertilizer containing >4% nitrogen applied to the young tree at the rate of ½–1 lb per 1–3 year old tree should suffice. This should be accompanied by ½–1 lb of compost per square foot of root area, applied from 4" away from the trunk to just beyond the drip line.

Some good sources of organic fertilizer include:

	N-P-K
Dr. Earth	4 - 7 - 3
Sustane	4 - 6 - 4
Sustane	8 - 4 - 4
Blood Meal	12 - 0 - 0
Bat Guano*	10 - 6 - 2

\*bat guano comes in two formulations, one high in N, one high in P. In this case, use the former.



### Award-Winning Apprentices

Several of the graduates of the six-month CASFS Farm & Garden Apprenticeship training course were recently honored for their work in organic farming and gardening programs –

**Karen Washington**, a 2008 Apprenticeship graduate, was honored at the White House on December 17 for her work with urban gardens in the Bronx.

First Lady Michelle Obama presented Washington and Gregory Long, director of the New York Botanical Garden, with a 2010 National Medal for Museum and Library Service. The National Medal is the nation's highest honor for museums and libraries that make extraordinary civic, educational, economic, environmental, and social contributions.

A lifelong New Yorker, she is a member of the botanical garden's board. She has been a community activist in the Bronx since 1985 where she has helped turn empty lots into community gardens as head of Bronx Green-Up.

As a member of La Familia Verde Garden Coalition, Karen launched City Farms Market, bringing garden-fresh vegetables to her neighbors. She is also on the board of Just Food, an all-volunteer effort promoting a holistic approach to food, hunger, and agriculture issues, and she leads workshops on food growing and food justice for community gardeners all over New York City. She was recently hired as an instructor in the new Farm School NYC: the New York City School of Urban Agriculture, which began this January.

**Doron Comerchero** (2004) was selected for a "NEXTie" award from Santa Cruz Next, a group that seeks to encourage and connect new generations of local leaders. Doron was recognized for his work with local teens through "Food, What?!", a Life Lab-affiliated food justice and youth empowerment group based at the UCSC Farm. You can read more about Doron's work and the NEXTie award at [www.goodtimesantacruz.com/good-times-cover-stories/2093-and-the-nextie-goes-to.html](http://www.goodtimesantacruz.com/good-times-cover-stories/2093-and-the-nextie-goes-to.html).

**Corey Block** (2008) is the Urban Farm Coordinator for the Treasure Island Job Corps Farm Project, which just received the Best Green Community Project from San Francisco's Neighborhood Empowerment Network. Read more about the Treasure Island Urban Farm project at [www.jobcorpsnews.org/treasureisland/treasure-island-job-corps-urban-farm-an-introduction](http://www.jobcorpsnews.org/treasureisland/treasure-island-job-corps-urban-farm-an-introduction).

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### *Gardening Seasons — from page 5*

are best eaten out of hand or made into jellies and jams. Next come the European and prune plums, which are much sweeter than the Japanese types. The flesh separates easily from the stone and they are often blue- or purple-skinned. These plums are great for eating fresh or drying, and for baking into tarts.

Late June through late July brings us the European butter pears—Belle de Guigno, B.P. Morettini, Araganche, and Ubileen. Unlike winter pears, they can ripen and be picked fresh off the tree. The excellent winter pears—D’Anjou, Comice, Bosc, and others—ripen (off the tree) in September-October.

The first apples arrive in early to mid August. Making the earliest appearance are Tydeman’s Red, Chehalis, William’s Pride, and Pristine. Late August through mid October features the more complex-tasting varieties, such as Elstar, Gala, Cox’s Orange Pippin, Jonagold, Mutsu, Spigold, etc. Beginning in mid October, the late-season apples appear—Fuji, Pink Lady, Braeburn, Yellow Newtown Pippin, Granny Smith, and finally in December, Haver’s Pippin.



Apples and plums from the Alan Chadwick Garden.

### *Santa Cruz Fall — October 15 - December 1*

This period of the gardening year often is indistinguishable from “Phase Two” of summertime. In the kitchen, the last of summer’s bounty of tomatoes, peppers, corn, and beans are canned, dried, or smoked. This is also the time to cure and store winter squashes. The first of the late summer- and fall-planted crops can be enjoyed, including peas, carrots, beets, lettuce and broccoli. In the garden, cover crops are sown to protect the soil and ensure organic matter to turn under in spring or harvest for compost piles. The final cool season crops are seeded and transplanted, and garlic and onions are planted for next summer’s harvest.

As for the weather, October usually sees one to three significant wet systems lumbering in from the Gulf of Alaska (with or without a mix of tropical warm moisture). The days cool down, and the nights become longer and colder, often dropping into the 30’s and 40’s. After the first several rains the early mushrooms spring up—Agaricus, oysters, and Boletus.

### *Santa Cruz Winter — December 15 - March 15*

In Santa Cruz, late November through February are the only truly quiescent months in the garden. Now is the time to be thankful for the energy mustered for fall sowings and plantings, and for putting food by during the previous two months. As winter brings higher market prices on produce, it is especially satisfying to be able to eat out of the garden and larder.

December through February are Santa Cruz’s coldest and wettest months of the year, often averaging more than 10 inches of rain per month, and in excess of 20 inches per month during El Niño years. This is a good time for leafing through seed catalogues, reflecting and planning to ensure next year’s bountiful harvests, and of course, for refining one’s cooking skills.