

# CROP ROTATION

**The replant syndrome & crop rotation are crucial for mature gardens—edible and ornamental.**

Crop rotation can also be called the replant syndrome and I have seen literature discussing this phenomenon in rose gardens and apple orchards.

Farmers rotate their crops. For example tomatoes are usually planted once every 3 years (a 3-year cycle). Roses for the bare root trade are grown on a 5-year cycle. Roses take 2 years to harvest and other crops are grown for the next 3 years. Farmers rotate to avoid having to deal with the diseases and pests associated with the remains of the last crop.

The ground surrounding any living plant will accumulate dead roots of that plant over time. When an annual farm crop is harvested there are suddenly a lot of dead and dying roots of that crop. If the same or related plant is installed immediately, it will be stunted, often severely, fighting diseases associated with the decaying root tissue. Unrelated plants are generally not affected.

You can grow tomato plants for 2 or even 3 consecutive years, but each year the yield is less and the plant shows less vigor and more yellow foliage. By the 3rd year the yield may not justify the crop. Without sufficient time between crops the volume of dead tomato root is increasing faster than it is decomposing along with the associated diseases. Tomato plants may not grow well for another 4-5 years. If the crop is only planted every 3rd year the carry over of dead tomato root and the associated diseases becomes insignificant. For the alternate crops the farmer plants only crops that are not related to tomatoes.

Farms can get around crop rotation with soil sterilization using fumigation. Fumigation apparently neutralizes the build up of dead tissue. Forestry experts know that a severe fire will renew the forest. Cooking the soil, even just the top foot or so, is enough to allow regrowth of the same trees. Surveys have shown that in rain-forests (where fires are rare) 2 trees of the same species are separated by an average of 175 yards. Lack of fires (and lack of Ice Age glaciers) results in much more diversity in rain forests than in drier areas.

Some plants are much more tolerant of replanting than others. Grasses are highly tolerant, however, the first time a lawn species is planted it shows the most vigor.

If you desire to replant immediately you can always rotate the soil instead. In apple orchards replacement of ½ cubic yard (3 feet by 3 feet by 18 inches deep) of soil (from a location away from the Apple trees) gives excellent results. In rose gardens replacing about 1 cubic foot of soil gives good results. If the plant being installed has its own soil ball the replacement volume can be reduced.

You must also do that same soil replacement when installing a plant within the root zone of an existing related plant, such as, when squeezing in a new rose plant in-between older, established rose bushes. Double-digging a bed is another method of soil rotation. The top 12" layer of soil is exchanged with the 12" layer directly below it. Because plants don't root much deeper than 12", the underlying layer will contain very few roots of the previous crop.

The replant syndrome is related to plant longevity. penstemons are known to perform well in the same soil for about 3 years. After that period they falter and eventually die. Simply replanting the same plant a few feet away can rejuvenate them. Our container growers have told me that during winter they cut them down, pull them out and put them back into the same container with fresh soil for another year of good vigor. Also, penstemons are usually propagated with stem cuttings. This is equivalent to putting virgin soil around an old plant (the cutting).

The replant syndrome in plants is analogous to human public health practices. Human babies cannot thrive if in close proximity to dead tissue of other humans. There is little or no effect if the dead tissue is fish, mouse, snail or insect. There is also little effect if the dead human tissue is cooked or cremated.