Linda Chalker-Scott, Ph.D., Extension Horticulturist and Associate Professor,
Puyallup Research and Extension Center, Washington State University

The Myth of Vitamin Stimulants:
"Vitamin B-1 reduces transplant shock by stimulating new root growth"

The Myth

Ever seen this advertisement? "[Product X, which contains vitamin B-1] stimulates the quick formation of new root hairs and revitalizes the delicate feeder roots that are often damaged in transplanting. [Product X] is especially designed to hasten the development of bareroot roses, shrubs, shade trees and bedding plants that have been moved to new locations. It helps plants become established quickly and ensures vigorous growth." Another adds a little scientific terminology to convince you: "Vitamin B-1 (plus minor elements and chelating agents) is great for root growth and helps reduce transplant shock." Or how about this one? "The combination of Vitamin B-1 with essential micro nutrients forms a highly effective mixture...and lessens the chances of transplant shock and plant stress."

Aren't you convinced that if you don't use products with Vitamin B-1 your transplants will suffer? Apparently administrators at one large university are. Under their "Typical Tree Protection and Relocation Specifications" is the following: **"**48 hours prior to cutting, an application of vitamin B-1 shall be administered to the rootball of the tree." If a university requires this practice, it must be legitimate, right?

The Reality

Applying vitamin B-1, or thiamine, to root systems of whole plants does not stimulate root growth. This is a myth that refuses to die, though it has been repeatedly refuted in the scientific literature. To understand why, it helps to think about this in a historical perspective.

Many decades ago the plant growth regulators called auxins were isolated and characterized. Auxins were found to stimulate cell elongation in both root and shoot tissues. Commercial preparations were developed that contained auxin and vitamin B-1 among other ingredients. Research in 1949 found improved root development in plants treated with one of these preparations (*Transplantone*, which contains both auxin and thiamine), but noted the importance of auxins in this response. Further research throughout the last half of the 20th century investigating the application of auxins to root systems suggested that auxins may stimulate root growth, but that vitamin B-1 on its own does not.

So what does work for stimulating root growth and reducing transplant shock? A review of the historical and current literature suggests the following:

Indole butyric acid (IBA) is one of the most common auxin formulations especially in tissue culture. In cuttings, it has been found to increase the number of roots, to increase rooting percentage, to increase both parameters, or to do neither. IBA has had some success in root regeneration in transplanted trees; it may help redirect resources to the roots by suppressing crown growth.

Naphthylacetic acid (NAA) is also a commonly used auxin and often the active ingredient in commercial preparations. NAA tends to be toxic to seedling root development, as it inhibits primary root growth and enhances lateral root growth. This latter activity may account for NAA's success in regenerating roots of transplanted and root-pruned trees. Like IBA, NAA apparently suppresses crown growth, which also may redirect resources to the roots.

Paclobutrazol (PBZ) is another plant growth regulator that seems to stimulate root growth in containerized as well as established tree species. Like the auxins, PBZ reduces crown growth which may assist with root resources.

Fungicides may increase root growth, but overall this is not beneficial to the plant. Fungicides kill beneficial mycorrhizal species, and the lack of mycorrhizal colonization means that plants must put more resources into root growth than they would if mycorrhizae were present. Furthermore, there are beneficial fungi and bacteria that control pathogenic microbes and roots colonized by beneficial microbes have been shown to grow more than those without.

Nitrogen supplements can improve root growth, and conversely the absence of nitrogen will depress root growth. Uptake competition from bacteria, fungi, and other plants can be intense and so nitrogen is often limiting.

Vitamin B-1 (thiamine) is an important component of tissue culture media, in which isolated plant tissues can be propagated. Its use for stimulating root growth in whole plants is not supported in the literature and one study reported that root growth was greater in the control treatment (water) than with thiamine. Plants in the field manufacture their own source of thiamine and it is therefore unnecessary to add any additional levels. Many fungi and bacteria associated with plant roots also produce thiamine, so it's likely that healthy soils will contain adequate levels of this vitamin without amendment.

Why does the mystique of vitamin B-1 transplant tonics still persist after decades of scientific debunking?

The Bottom Line

- Vitamin B-1, aka thiamine, does not reduce transplant shock or stimulate new root growth on plants outside the laboratory
- A nitrogen fertilizer is adequate for transplanting landscape plants; avoid use of "transplant fertilizers" that contain phosphate
- Healthy plants will synthesize their own thiamine supply
- Healthy soils contain beneficial microbes that synthesize thiamine as well
- Difficult-to-transplant species may be aided by application of auxin-containing products in addition to nitrogen, but read the label and don't add unnecessary and potentially harmful chemicals (this includes organics!)
- Adequate soil moisture is crucial for new root growth; be sure to irrigate new transplants frequently and use mulch to reduce evaporation

For more information, please visit Dr. Chalker-Scott's web page at http://www.theinformedgardener.com.