Vigorous Plant Growth Depends on Well Developed Roots

A strong, healthy root system is vital to a strong healthy plant. Plants with poor or marginal root systems are more susceptible to draught stress and secondary attacks by disease and insect pests. To promote vigorous root growth, you need an understanding of how and where roots grow.

Soil must provide a good environment for root growth, not just anchorage for the plant. In most soils, root systems are much more shallow and widespread than often believed. True taproots are rare in nature. Subsoils are usually not suitable for root growth, so there is little reason for a taproot to develop. Most of the large anchoring roots of trees are located in the top two to three feet of soil. The fine roots, which are the primary site of water and mineral absorption, are usually located within the top four to eight inches of soil — the area most conducive to root growth. The lateral spread of the root system is usually many times that of the branches. The commonly held belief that the root system mirrors the above ground portion of the plant is unfounded. This can easily be seen on trees that have been excavated by construction activity or blown over by high winds.

Root systems are dynamic. The fine roots are continually growing, dying and being replaced by other fine roots. A few of these succulent fine roots persist to eventually become woody structural roots. In nearly all plants, the fine roots form symbiotic associations with common soil fungi called mycorrhizae. These mycorrhizal roots often do not appear to be any different to the untrained eye, but are very important for nourishment of the plant. Simply stated, the mycorrhizae act as extensions of the root system and aid in absorption of nutrients from the soil, especially in infertile soils. Plants without mycorrhizae usually grow slower than those with mycorrhizae growing on the same site.

When field-grown plants are transplanted, often up to 95 percent of the root system is left behind. In other words, five percent of the root system must support 100 percent of the tree until new roots regenerate. In soils with normal drainage, this can lead to severe draught stress, which in turn can reduce root regeneration. In this situation, regular watering is imperative. In soils with poor drainage or a heavily compacted layer below the surface, the planting hole will often fill up with water from normal rainfall. Methods of removing the excess water may have to be devised and additional watering may only aggravate the situation.

When roots are cut during the transplanting process, new rootlets originate from the end of the severed roots at the edge of the root ball. Few, if any, lateral roots are formed within the root ball. In light of this, root pruning is of questionable value. It has been shown that transplanting during the period of early shoot development in the spring reduces overall root regeneration. At this time, the roots are competing with the shoots for common source of carbohydrate reserves. If transplanting is delayed until the leaves begin to expand, the leaves will be producing carbohydrates through photosynthesis, and competition for existing reserves is reduced, resulting in better root growth.

After large trees are removed, it is common to observe a long period of slow growth, often lasting many years. This extended period of reduced vigor often results in concern for the sur-

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(Good Roots cont'd.)
vival of the tree. To the contrary, this period of slow growth should be expected since the plant is being supported by such a limited root system. Not until the root system is once again in balance with the above ground portion of the plant will

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vigorous growth resume. The length of time required is closely related to the size of the plant, and is directly dependent on the original lateral root spread. Roots grow radially from the trunk in a linear fashion and at a similar rate, independent of the size of the plant. The longer the linear distance that must be covered to replace the original root system, the longer the period of slow top growth. Calculations show that the root system of a 4-inch tree would probably take four to five years, while that of a 10-inch tree could take as long as 13 years under the same growing conditions. It is important to remember that a plant is only as good as its root system. Care should be taken to provide adequate soil conditions for good root development. After transplanting, there is a period of slow growth while the root system catches up with the above ground growth of the plant.

Credit: OGA Notes, Summer 1987

TURFGRASS AND ORNAMENTAL CHEMICAL SEMINAR

TIME: November 27 - 29, 1990

LOCATION: Purdue University, West Lafayette, IN

CCH CREDITS: Category 3B/10/3A - 9 units (requested)

Tuesday, November 27, 1990

9:00-9:30 a.m.	Registration
9:30-10:00 a.m.	*Turfgrass Physiology* – Jeff Lefton, Extension Turfgrass Specialist
10:00-11:00 a.m.	*Turfgrass Insect Biology* – Jeff Lefton
11:00-Noon	*Turfgrass Insect Control Update* – Tim Gibb, Ph.D., Director, Insect Diagnostic Lab
Noon-1:00 p.m.	Lunch – on your own
1:00-2:55 p.m.	*Soil Chemistry and Pesticides* – Jim Ahlrich, Ph.D., Soil Chemist
2:55-3:00 p.m.	Break
3:00-4:00 p.m.	*Pesticides and Organic Matter* – Ron Turco, Ph.D., Soil Microbiologist
4:00-5:00 p.m.	*Pesticides and Clothing* – Cherilyn Nelson, Ph.D., Consumer Products Specialist

Wednesday, November 28, 1990

8:00-9:55 a.m.	*Steps in the Diagnosis of Pest Problems* – Melodie Putnam, Ph.D., Director, Plant and Pest Diagnostic Lab
9:55-10:00 a.m.	Break
10:00-11:00 a.m.	*Integrated Pest Management of Turf and Ornamental Problems* -- Clifford Sadoff, Ph.D., Extension Entomologist
11:00-Noon	*Choosing Turfgrass Fertilizers* – Clark Throssell, Turfgrass Research Scientist
Noon-1:00 p.m.	Lunch – on your own
1:00-2:00 p.m.	*Micronutrients and Soil Sampling* – Clark Throssell
2:00-2:55 p.m.	*Turfgrass Disease Identification* – Jeff Lefton
2:55-3:00 p.m.	Break
3:00-3:30 p.m.	*Turfgrass Disease Control* – Zachary Reicher, Turfgrass Research Scientist
3:30-4:15 p.m.	*Patch Disease and Control Strategies* –Zachary Reicher
4:15-5:30 p.m.	*Broadleaf Herbicides* – Jeff Lefton

Thursday, November 29, 1990

8:00-9:00 a.m.	*Crabgrass Control Strategies* – Zachary Reicher
9:00-9:30 a.m.	*Overseeding Study* – Zachary Reicher
9:30-9:55 a.m.	*Post-Emergent Crabgrass and Nutsedge Control* – Clark Throssell
9:55-10:00 a.m.	Break
10:00-11:00 a.m.	*Poa annua Control* – Clark Throssell
11:00-11:30 a.m.	*Growth Regulators* – Clark Throssell
11:30-Noon	*Calibration Study* – Jeff Lefton
Noon-1:00 p.m.	Lunch – on your own
1:00-2:00 p.m.	*Ornamental Bed Weed Control* – Phil Carpenter, Ph.D., Ornamental Horticulturist
2:00-2:55 p.m.	*Ornamental Insects and Their Control* – Clifford Sadoff
2:55-3:00 p.m.	Break
3:00-4:00 p.m.	*Ornamental Diseases and Their Control* – Paul Pecknold, Ph.D., Extension Plant Pathologist

A brochure with a complete program description will be sent to various mailing lists by early November. If you do not receive information on this program please call Jo Horn at 317/494-8039.