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## Trees and Turf: Learning to Live Together

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### TREES – THE BIGGEST PROBLEM OF GOLF COURSE TURF

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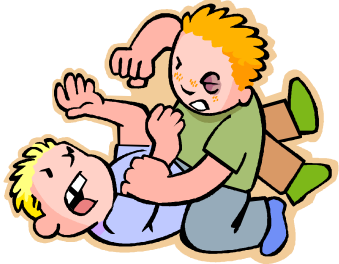
Trees clearly are important assets on most golf courses in the northern sections of the United States, providing a great deal of beauty and strategic interest and serving a variety of other important functions. On the other hand, the effects of trees are a major cause of poor quality turf on parts of many courses. In some cases, trees have come to overwhelm the courses from both an agronomic and playability

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## Trees and Turf: Doomed to Fight?



A cartoon illustration of two young boys wrestling. One boy is on top, pinning the other to the ground. They are both smiling and appear to be having fun.

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Potential impact between trees and turf

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Where you stand depends on where you sit

- Tree impacts on turf
- Turf impacts on trees

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Potential interaction between plants

- Negative
  - Competition
  - Allelopathy
- Positive
  - Facilitation

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Competition

- Above ground
  - Light
- Below ground
  - Water
  - Nutrients

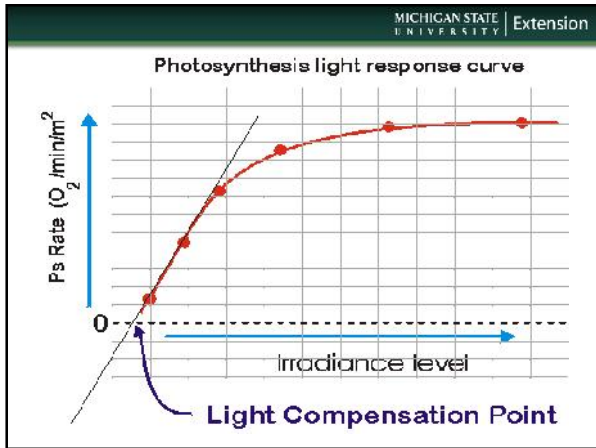
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Light

- Shade is typically the biggest impact of trees on turf

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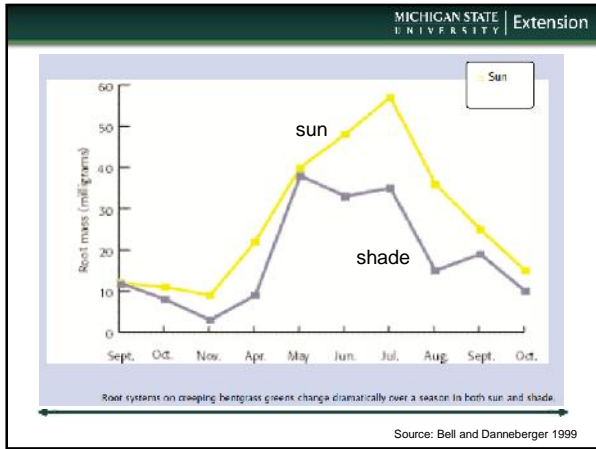


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### Relative shade tolerance of turf grasses

Tolerance	Grass	
	Cool-season	Warm-season
Excellent	Pine fescues	St. Augustinegrass
Good	Creeping bentgrass	Zoysiagrass
	Colonial bentgrass	
	Rough bluegrass	
	Tall fescue	
Fair	Perennial ryegrass	Bahiagrass
		Carpetgrass
Poor	Kentucky bluegrass	Centipede
		Bermudagrass

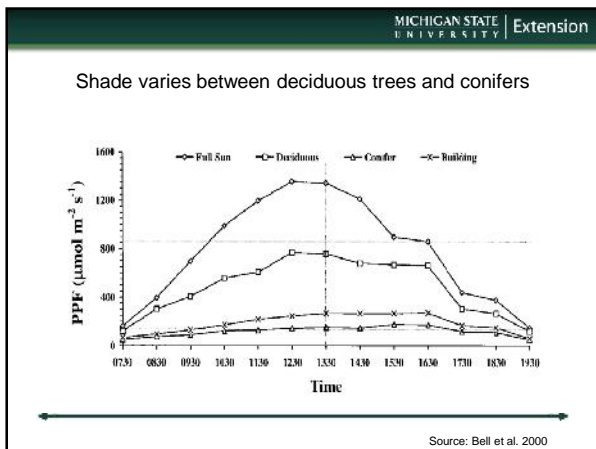
Source: Dudek and Peacock 1992



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### Shade

- Need to consider:
  - Intensity
  - Duration



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### Dealing with shade

- Route traffic to sunny side of fairway
- Move pin placement regularly

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### Light quality

- Tree canopies intercept red wavelengths
- Red/Far red can impact plant morphology
- Low red contributes to thin turf blades and poor root systems

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### Tree shade affects light quality

Shade type	R/FR
Full sun	0.9950
Deciduous	0.9147
Coniferous	0.8058
Building	0.9430
LSD $\ddagger$	0.0204

Bell et al. 2000

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### Other impact so trees on turf

- Diseases
- Litter
  - Leaves
  - Debris
  - Honeydew
- Roots
- Root suckering
- Wildlife

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### Stem and root suckers

The diagram illustrates two types of tree suckers. On the left, a 'Tree-like' sucker is shown growing from a stump, with a small tree-like structure above it. On the right, a 'Fir' stump is shown with several small, upright suckers growing from its base. Below these, a 'Poplar' stump is shown with a long, horizontal stem that has several upright suckers growing from it.

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### Turf impacts on trees

The diagram shows a large tree with a dense canopy. Below the ground surface, a cross-section of the turf is shown, illustrating the root system of the tree extending into the soil. A small figure of a person is shown next to the tree for scale. A circular inset at the bottom right shows a cross-section of the turf with roots growing through it.

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### Below-ground competition

- Water
- Nutrients

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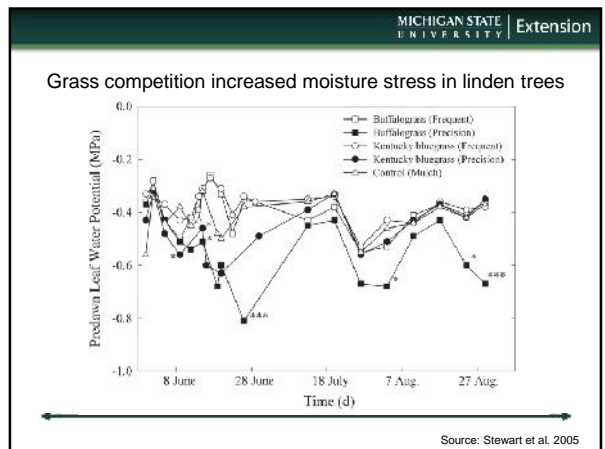
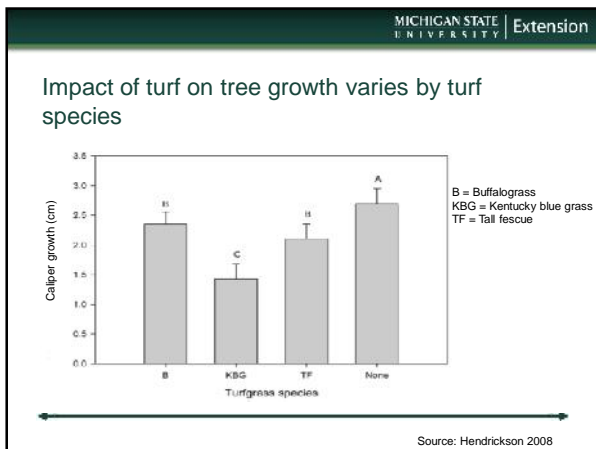
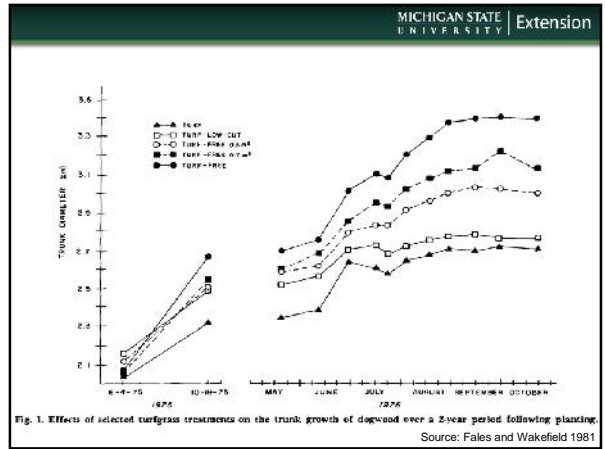
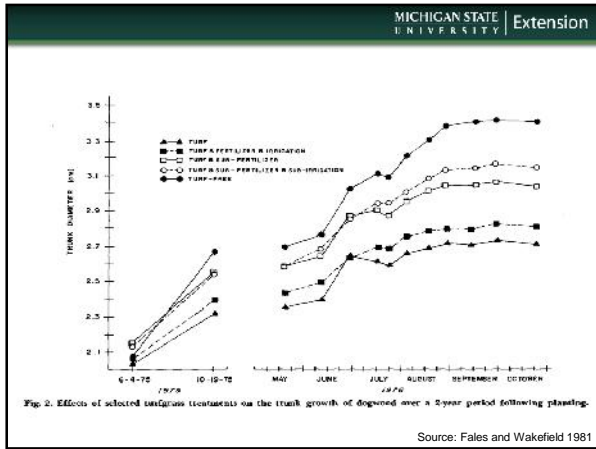


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### Common misconception about trees

- Tree crown mirrors above ground portion of tree
- Wrong: Most tree root systems are shallow and extensive
- Tap-roots are largely for support

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**Table 4. Percentage of N in forsythia and dogwood leaf tissue.**

Treatment	Forsythia		Dogwood	
	1975	1976	1975	1976
	%			
1. Turf (check)	1.80 c*	1.90 b	1.73 c	1.54 b
2. Turf + fert.	1.78 c	1.82 b	1.76 c	1.57 b
3. Turf + fert. + irrig.	1.76 c	2.04 b	1.71 c	1.70 b
4. Turf + sub-fert. + sub-irrig.	2.18 b	2.61 a	1.90 bc	1.97 a
5. Turf + sub-fert.	2.31 b	1.86 b	2.17 a	1.61 b
6. Turf: low-cut	1.96 bc	1.75 b	1.81 c	1.55 b
7. Turf-free, 0.3 m'	2.29 b	1.85 b	1.88 c	1.64 b
8. Turf-free, 0.7 m'	2.66 a	2.08 b	2.06 ab	1.89 b
9. Turf-free	2.81 a	2.71 a	2.11 a	2.04 a

\* Means within columns followed by different letters are significantly different at the 5% level according to Duncan's Multiple Range Test.

Source: Fales and Wakefield 1981

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## Allelopathy

- Chemical inhibition of one plant by another
  - Seed germination
  - Root growth

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## Allelopathy

- Trees can have allelopathic effects on turf
- Turf can have allelopathic effects on trees

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## Ensuring peaceful coexistence

- Minimize conflict points
- Identify priorities
- Consider alternatives
- Expect the unexpected
- Understand the other side

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## Minimize conflict points

- Give each their own space
- Best done in planning and design
  - REMEMBER: Trees Grow!
- Design beds or borders specifically for trees
- Allow mulched turf-free zone around trees



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### Identify priorities

- Sometimes something has to give
- Decide on a priority and go with it

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### Consider alternatives

- May require some creativity
- Example: trees shading Kentucky blue grass turf resulting in decline
  - Thin trees or crown
  - Replace KBG with more shade tolerant turf

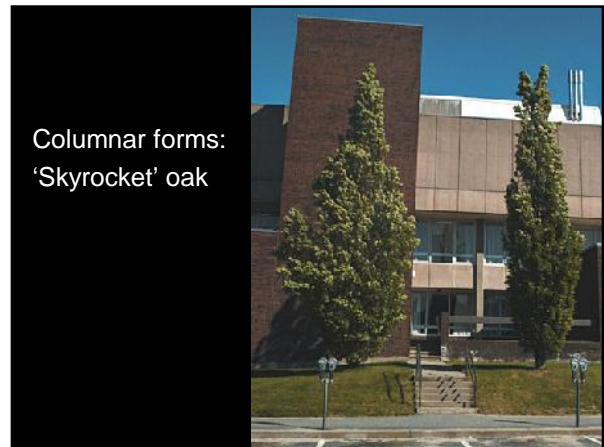
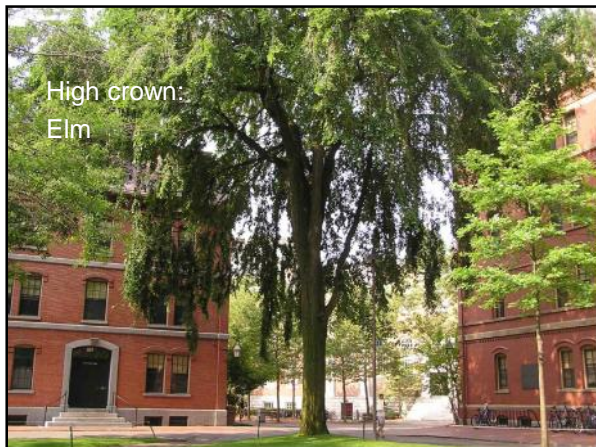
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### Consider alternatives

- Use deciduous trees instead of conifers
- Thin tree crowns or use trees with the naturally open canopies
- Use trees or shade tolerant ground cover in areas poorly suited to grass

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### Expect the unexpected

- Managing for one resource will invariably have impacts on the other




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### Factors affecting response of trees to root pruning

- Root size: larger roots may generate few new roots
- Number of cuts: more roots cut means more tree stress
- Proximity to the trunk: the closer cuts are to the trunk the bigger the impact
- Tree age: old trees are more likely to stress and die
- Tree condition: trees in poor health should not be root pruned
- Tree lean: leaning trees should not be root pruned
- Soil type and site drainage: shallow soils mean stay farther from the trunk

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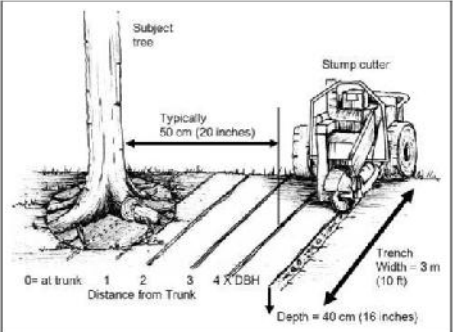
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### How close to trunk can roots be safely pruned?

- Rule of thumb: 3-5 X trunk diameter
- For example: 24" (2') diameter tree
- Safe distance = 2' x 3-5 = 6-10' from trunk

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Source: Smiley 2008

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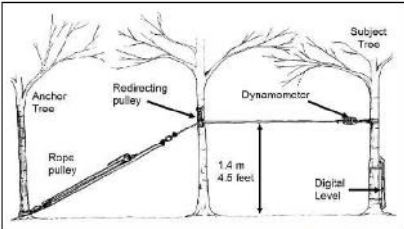


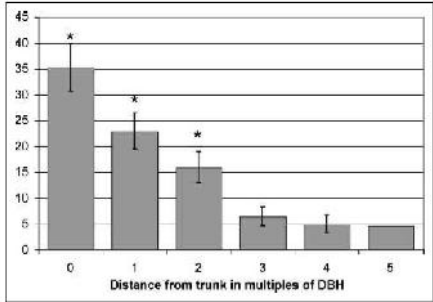
Figure 1. Diagrammatic representation of the pull-testing setup.

Source: Smiley 2008

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### Effect of root pruning on resistance to pulling force



Distance from trunk in multiples of DBH	Resistance to pulling force
0	~35*
1	~22*
2	~16*
3	~8
4	~6
5	~5

Source: Smiley 2008

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