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## **DID YOU KNOW**

### **Trees & Grass Both Clean the Air – *Turf Resource Center***

#### **Did you know?**

- To a greater extent than trees, turfgrass acts as an agent to purify contaminants and control soil erosion.<sup>10</sup>
- Lawns are very efficient oxygen producers. They are about three times more effective than trees. And, their season to produce oxygen is much longer than trees.<sup>17</sup>
- Another almost counter-intuitive assertion comes from Ron Barnett of American Plant Food, who states that turf produces more oxygen per square foot than "anything else" and replacing it with a patio or a single tree would be a net loss to air quality.<sup>18</sup>
- A typical 18-hole golf course produces enough oxygen to support 4,000 to 7,000 people. That means a state like Georgia for example, with its 430 golf courses, produces enough oxygen for more than 1 million people.<sup>19</sup>
- While carbon sequestration exists on tees, it was not nearly as much as occurs on the fairways and greens, and the researchers are still investigating the reasons for this difference.<sup>20</sup>
- A University of Manchester study has calculated that a mere 10 percent increase in the amount of green space in built-up centers would reduce urban surface temperatures by as much as 4°C (7.2°F). This 4°C (7.2°F) drop in temperature, which is equivalent to the average predicted rise through global warming by the 2080s, is caused by the cooling effect of water as it evaporates into the air from leaves and vegetation through a process called transpiration.<sup>21</sup>

“As the concern about global warming continues to escalate, local municipalities, state agencies and governments across the globe are attempting to address environmental concerns with the best of intentions. But some of their decisions, though well intended, may actually create unpleasant consequences in the not to distant future,” according to Turf Resource Center.

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An example of how some of these programs have evolved is evident by the “Cash for Grass” program introduced by the Victor Valley Water District in Victorville, California. In their effort to encourage water conservation they now offer incentives to homeowners who actually convert their natural turfgrass to artificial turf.<sup>22</sup> Of course, there are other numerous programs in different parts of the country that offer varied incentives to remove turf and replace it with native plants or plants considered more drought tolerant. In some cases trees are often encouraged but the use of turfgrass is discouraged. Could there be environmental consequences to such decisions? Why do some government decision makers view trees as being sacred and yet perceive grass as being bad? Perhaps it’s as much a matter of misinformation as it is education according to the Turf Resource Center.

Dr. Sylvan Addink, a Certified Professional Agronomist, offered the following comment as part of his executive summary for - *Trees Are Sacred, Grass Is Bad, Why?* “History is dotted with examples of worthy causes which have been promoted by the use of questionable scientific data and assumptions. Unfortunately, the errors are often uncovered after it is too late to correct the environmental problems which occur. In many urban water conservation programs there is a perceived difference in the benefits and costs of trees versus grasses. Trees are promoted while all types of grasses are restricted or targeted for removal. This perception is not fully based upon scientific fact but upon impressions and assumptions such as those we get when we see irrigation water running down the gutter in front of our homes each morning.”

The following is an excerpt from:

### **Trees Are Sacred, Grass Is Bad, Why?**

- Sylvan Addink, Ph.D, Certified Professional Agronomist

#### **Water Use of Trees Versus Turf**

If efficiently irrigated, research data indicates that many trees require as much water, if not more water than grasses. Research by Dr. Devitt et. el. in Las Vegas, NV indicated that “During the active growing season, tree to grass (Bermuda grass/ryegrass low fertility) water use ratios in the range of 2.0 to 4.0 were observed.”<sup>1</sup>

Evapotranspiration (ET) reflects the level of plant water use from both plant transpiration and evaporation. “Leaf area index (LAI), an important structural variable descriptive of vegetation, is directly related to evapotranspiration.”<sup>2</sup>

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This means that a similar amount of water will be required to maintain the same amount of leaf area, whether grass or trees with similar transpiration characteristics. The leaf area index for turfgrasses is similar or less than that of the forest leaf index for several common deciduous tree varieties, which supports the conclusion by Devitt referenced above.

Many environmental functions are related to leaf-surface area (e.g., reductions in air temperature, air pollution removal, volatile organic emissions, carbon dioxide sequestration)...<sup>3</sup> The greater the leaf area of the trees and grasses, generally, the greater will be the environmental benefits and the greater will be the amount of water required to sustain healthy growth of that plant.

It is also important to note that much of the water needed for healthy urban tree growth originates from irrigation of grass or other plant material. The inference is that the benefits provided by shade trees have little water cost since the plant material under the trees is considered to be the sole consumer of the irrigation water. This is incorrect since the removal of grass or other plant material will require separate irrigation cycles to maintain healthy shade trees.

### **Low Water Use Varieties**

There are varieties of trees, which are low water use, such as those of the Mesquite family. Similarly, there are low water use varieties of turfgrasses such as Bermudagrass, Zoysia, and Buffalograss which is native to the Southwest. In research done by the University of California Riverside, differing amounts of water were applied to common Bermudagrass. “Even with as little water as 50% of reference ET, the conclusion was that “common Bermudagrass quality was good throughout all treatments.”<sup>4</sup> Including consideration for irrigation distribution non-uniformity, this is within the target levels of water use promoted by conservation committees and public utilities.

Instead of restricting all types of turf, a balanced approach to water conservation includes recognizing the differences in both grass and tree varieties and their respective water needs.

### **Benefit-Cost Analysis**

An examination of total value of annual benefits from Modesto’s public trees by McPerson, et. al. was determined to be \$4,963,816.<sup>5</sup> Similarly, the projected value of annual benefits from an equivalent area of turfgrass is \$4,650,072. For a breakdown of these benefits and their assigned dollar values, please refer to the full article “*Trees are Sacred, Grass is Bad, Why?*” (See Note below for contact information).

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## **Energy Savings**

Energy savings are a major reason why municipalities and utilities promote planting of trees. Trees provide shade in addition to cooling the atmosphere through evapotranspiration. Likewise, grass areas also provide cooling due to evapotranspiration. It has been found that, “the front lawns of 8 average houses have the same cooling effect as 24 (3-4 ton capacity) home central air conditioning units.”<sup>6</sup>

A visual observation of most neighborhoods will indicate that trees are often placed too far from buildings to achieve maximum shade benefits. When trees do not shade buildings, the general cooling effect is similar to that of an equivalent area of turfgrass.

## **Air Quality Benefits**

Turf and trees are great assets to our communities because of their ability to entrap pollutants and remove CO<sub>2</sub> from the atmosphere. Research has shown that turfgrasses remove “atmospheric pollutants such as carbon dioxide, ozone, hydrogen fluoride, and perosyzacetylene nitrate from the air.”<sup>7</sup> “Grasses remove about 6 tons of CO<sub>2</sub> per acre per year from the atmosphere...”<sup>8</sup> Turfgrasses also reduce airborne dust particulates and “offer one of the most cost-efficient methods to control...wind erosion of soil.”<sup>9</sup>

## **Runoff Reductions**

With trees, most stormwater runoff reduction is due to the interception of rain by the tree’s leaves which delays water runoff for a short period of time. However, grasses will provide a significantly longer delay in runoff. The grass leaves slow down the flow of the water across the landscape’s surface, allowing the water to penetrate the soil. Because grasses prevent and delay runoff of water, they also impact the number of sewer overflow events in a city, where the sewer water and storm water are combined.

## **Filtering & Erosion Control**

To a greater extent than trees, turf acts as an agent to purify contaminants and control soil erosion. “Turf is good for filtering out oil and debris from the street. Grass is a tremendous medium to clean the environment.”<sup>10</sup> “Perennial turfgrasses offer one of the most cost-efficient methods to control erosion of soil.”<sup>9</sup>

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### **Aesthetic and Other Benefits**

It is no secret that mature trees will increase the property values in a neighborhood. Trees provide “beautification, privacy, shade that increases human comfort, wildlife habitat, sense of place and well-being that are difficult to price.”<sup>5</sup>

Similarly, surveys indicate that a well maintained lawn adds value to a home. Based on a Gallup survey on behalf of American Gardening Association, “A well-maintained lawn can enhance “curb appeal” adding as much as 15 percent to the value of a home.”<sup>11</sup>

Although grass areas do not provide privacy and shade like trees, they provide the unique benefits of a safe surface for children and athletes to play on, fire protection around the home and a high visibility zone that discourages unwanted intruders and vandals.<sup>9</sup>

### **Negative Perceptions of Turf**

After having considered the many benefits of both trees and turf, it is important to examine the misconception that maintenance of grass areas will have a greater negative impact on the environment than would occur with tree maintenance.

Lawns are criticized because of the grass clippings that are removed and disposed in landfills. However, if lawns are mowed on a regular basis there is no need to remove grass clippings from the lawn.

“Clippings are very high in water content and breakdown rapidly when returned to lawns after mowing, assuming lawns are mowed on a regular basis (not removing more than one-third of the leaf blade).”<sup>12</sup>

Raking of tree leaves can also generate a significant volume of waste – directly proportional to the leaf area index as discussed above.

Lawns are perceived to leach fertilizers into our water supply. Research indicates that when appropriate rates of fertilizers and pesticides are applied to a dense stand of grass, there is very little runoff or leaching from the fertilized site. “Whenever N is applied to a site, there is the possibility that some of it may run off into surface waters. However, several recent studies indicate that N carried in runoff from turf areas is very low, that is because turf is comprised of many closely spaced plants forming a relatively closed canopy over the soil surface.”<sup>13</sup>

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As with fertilizers, proper application of pesticides to turfgrass results in little impact on the environment. “Many university studies show that less than one percent of pesticides leach from the application site with the majority remaining in the turf or soil/thatch layer until it is degraded.”<sup>14</sup>

With proper education, “maintaining healthy turf areas can be accomplished by utilizing common sense and adhering to classic agronomic management principles. Know your soils and apply fertilizer and pesticides correctly. Adopt environmentally sound lawn service programs that will reduce leaching, runoff and erosion and maximize the environmental benefits of quality turfgrass.”<sup>15</sup>

### **Conclusion**

It is agreed that the Southwest has an impending water crisis which must be dealt with as the population grows and new urban water sources are developed at a much slower pace. Yet, some government agencies “are focused almost exclusively on projected water savings and have not fully contemplated the potential environmental impacts that may result from reducing the percentage of turf in the landscape.”<sup>16</sup> Many also have not considered the option of allowing greater plantings of low water use grass varieties. A balanced approach to water conservation recognizes that there are species of both trees and turf which conserve water while also providing many benefits to our cities and neighborhoods.

**By: Sylvan Addink, PhD.  
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20. Ron Follett of ARS' Soil-Plant-Nutrient Research Unit in Fort Collins, Colo., and Yaling Qian of CSU studied 16 soil records from golf courses in the Denver area, some of which go back 45 years. They found that carbon sequestration lasts for up to 31 years in fairways and 45 years in greens, after which the rates slow or become negligible.
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22. Victorville Daily Press, Victorville, CA (June 2007) and Victor Valley Water District website - <http://www.vvwater.org/conservation/cfg.htm>

**Note:**

For the full article "Trees are Sacred, Grass is Bad. Why?" contact Aqua Conserve, Inc. - [info@aquaconserve.com](mailto:info@aquaconserve.com)

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