# i-Tree Academy 2021

# Final Project

**Best tree species for Air pollution mitigation Tree planting project in Scotlandville, East Baton Rouge, Louisiana**


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# Introduction

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools. The i-Tree tools can help strengthen forest management and advocacy efforts by quantifying forest structure and the environmental benefits that trees provide. There are however various tools, and their uses depends on a number of factors which include but not limited to;

- Goal of the user/project
- Availability of Data
- Skill set availability

Overall, the various types of core i-Tree tools available are the following.

- i-Tree MyTree
- i-Tree Landscape
- i-Tree Design
- i-Tree Canopy
- i-Tree Eco
- i-Tree Hydro

One of the greatest applications of i-Tree is its ability to reveal benefit of current tree biomass and/or potential planting to targeted audience. It is a very proficient policy tools for advocating for tree planting and/or management. It is especially useful in current age where population growth has triggered urban expansion. This have led to several challenges for Urban dwellers as well as urban landscape. One of the major problems of Urban landscape is pollution. Unfortunately, this have been exacerbated by the wicked problem of climate change which affect

us all. According to World heath organization, WHO in 2016, more than 80% of people living in urban areas that monitor air pollution are exposed to air quality levels that exceed the World Health Organization (WHO) limits. While all regions of the world are affected, populations in low-income cities are the most impacted.

Scotlandville East Baton-rouge is one of the low-income communities in Baton-rouge Louisiana. Scotlandville became industrialized, beginning with a Standard Oil refinery in 1909, and was a destination of African Americans to urban areas in the Great Migration beginning around World War I. Its growth was stimulated also by construction of railroads along the Mississippi River. While still independent, Scotlandville became the largest majority-black community in the state. It is also home to industrial processing companies particularly chevron which contribute a lot of pollution to the community dwellers. Unfortunately like most low-income neighborhood, Scotlandville tree canopy cover have been disproportionately low over the years, making community dwellers more vulnerable to effect of air pollution.

This project will hence contribute to future tree planting initiatives by investigating the best trees species choices to be selected for potential tree planting initiative that can help mitigate air pollution in Scotlandville community. This will be done by selecting three native threatened tree species and comparing them using i-tree design software.

**Methodology**

Three (3) native tree species (*Acer rubrum, Quercus virginiana, Magnolia macrophylia*) that are common to this locality were selected. They were plotted in on a species-by-species basis and on a mixed species basis to compare for air pollution benefit for each of the specie and on mixed stand, to assess and recommended tree species for the best potential to mitigate polluted air in the

region. The report for air pollution avoided and carbon stored were compared, the conclusion and comparation was made on this result.

## Finding and discussions

### Carbon Storage

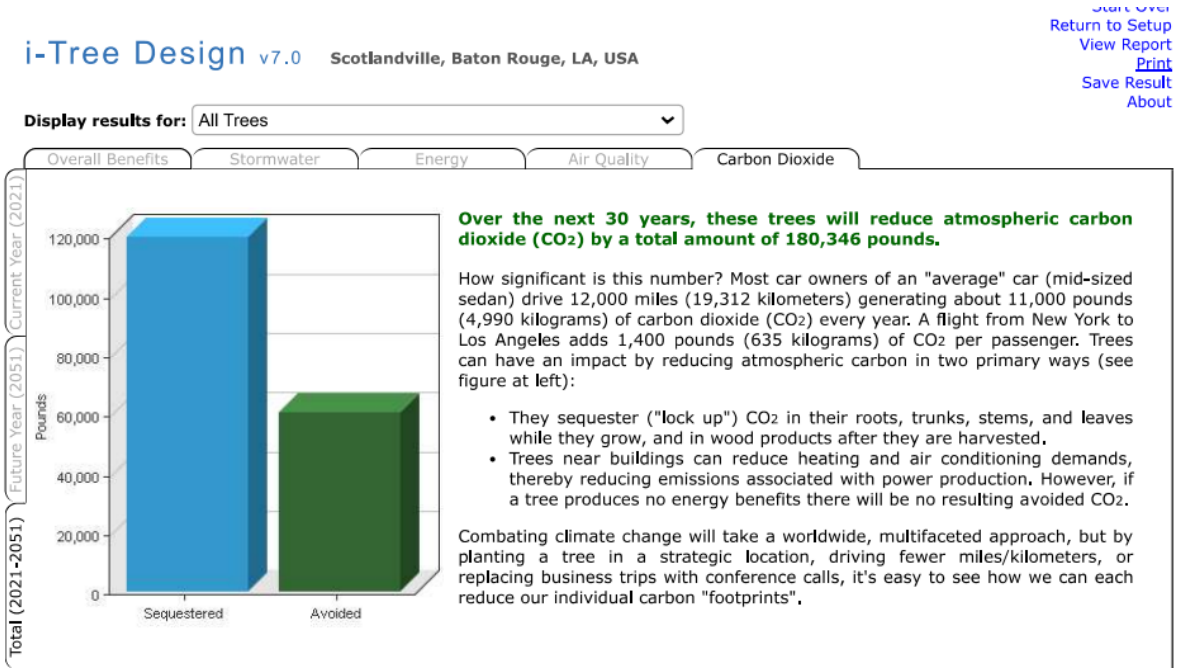


Fig 1: Carbon dioxide storage report for Big-Leaf Magnolia

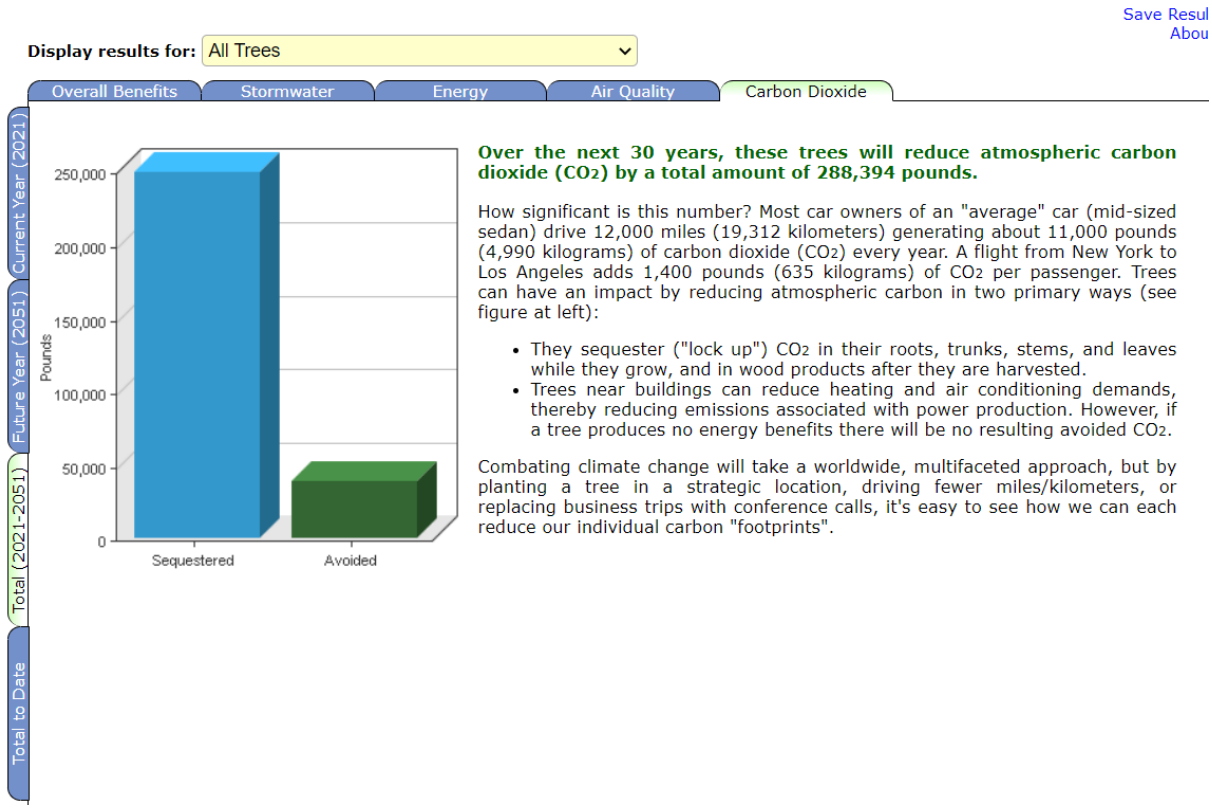


Fig 2: Carbon dioxide storage report for Live Oak

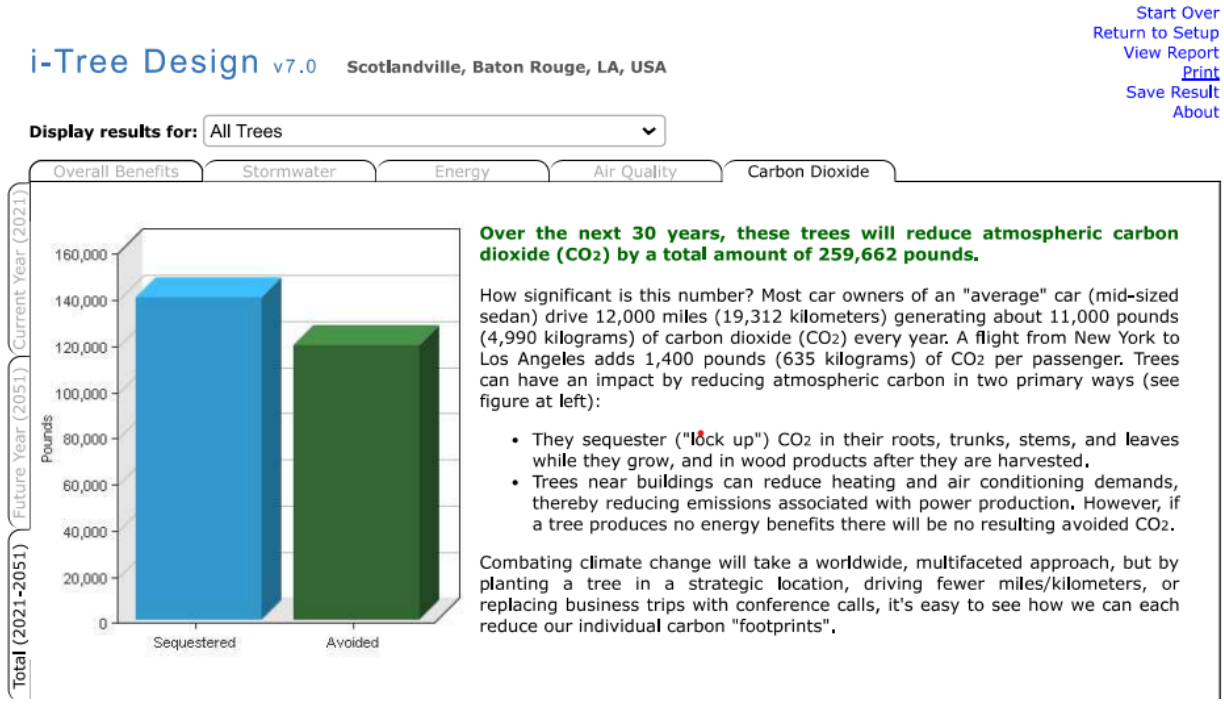


Fig 3: Carbon dioxide storage report for Red Maple

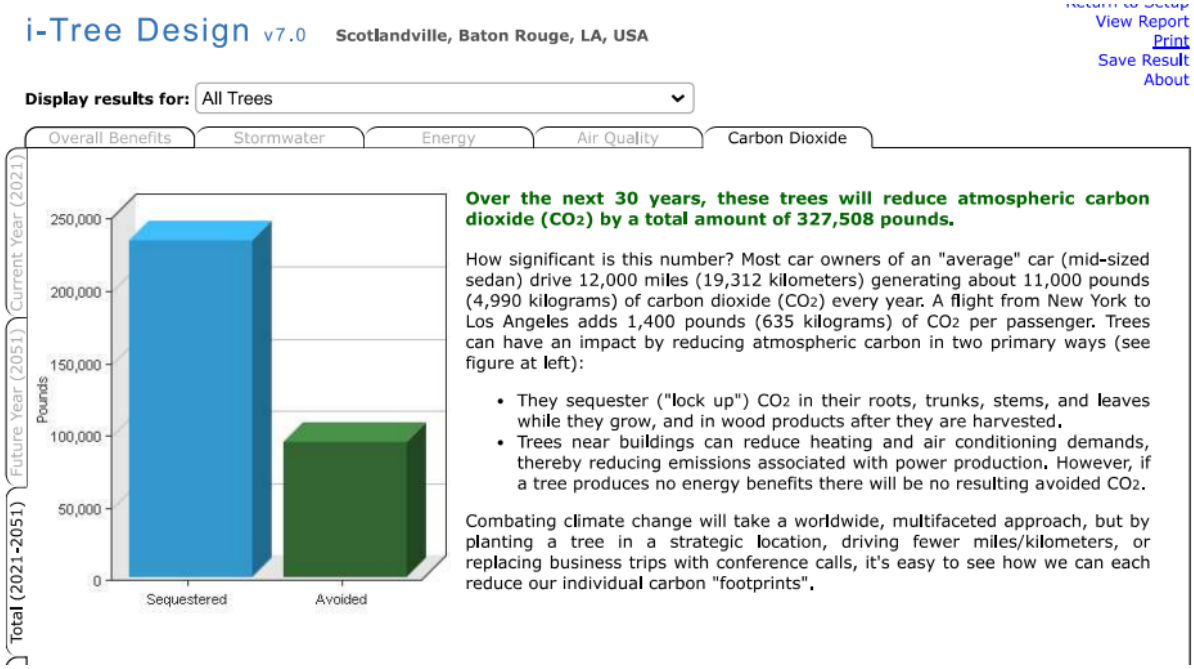


Fig 4: Carbon dioxide storage report for all the three species plotted together

## Air pollution

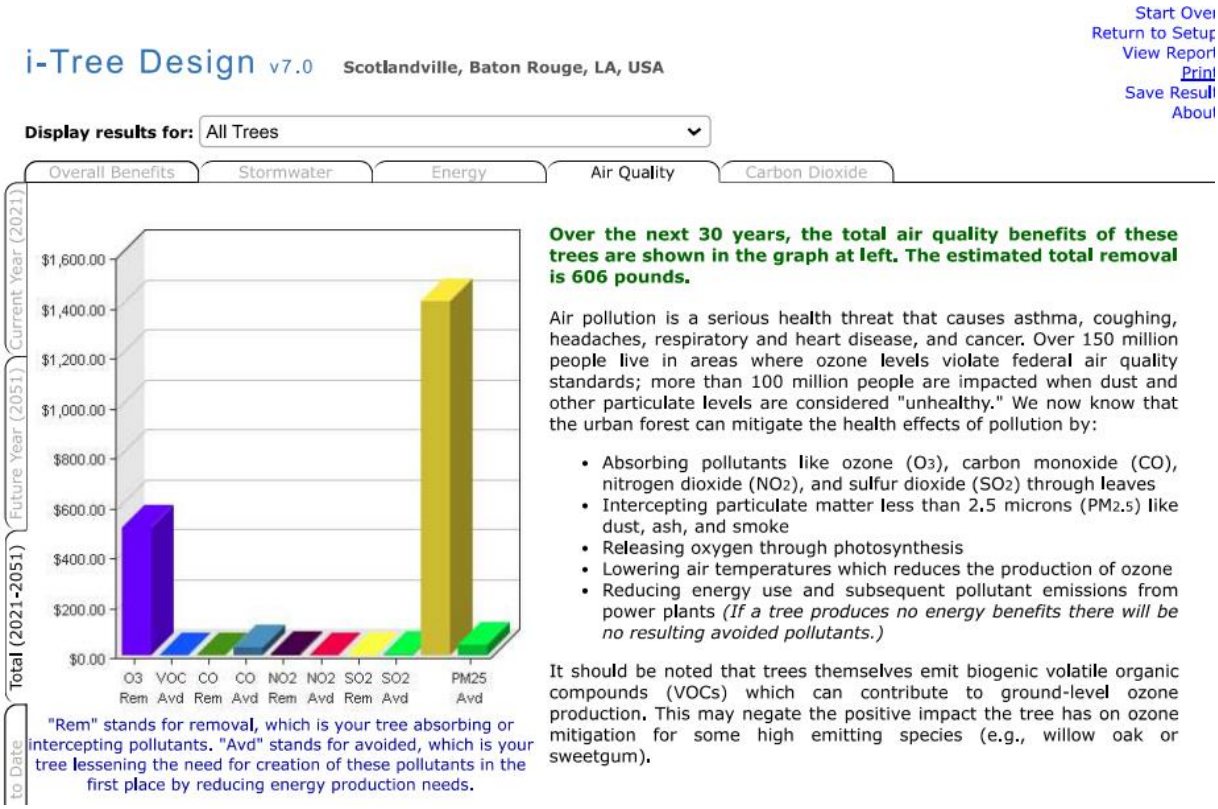


Fig 5: Air quality report for Big Leaf Magnolia

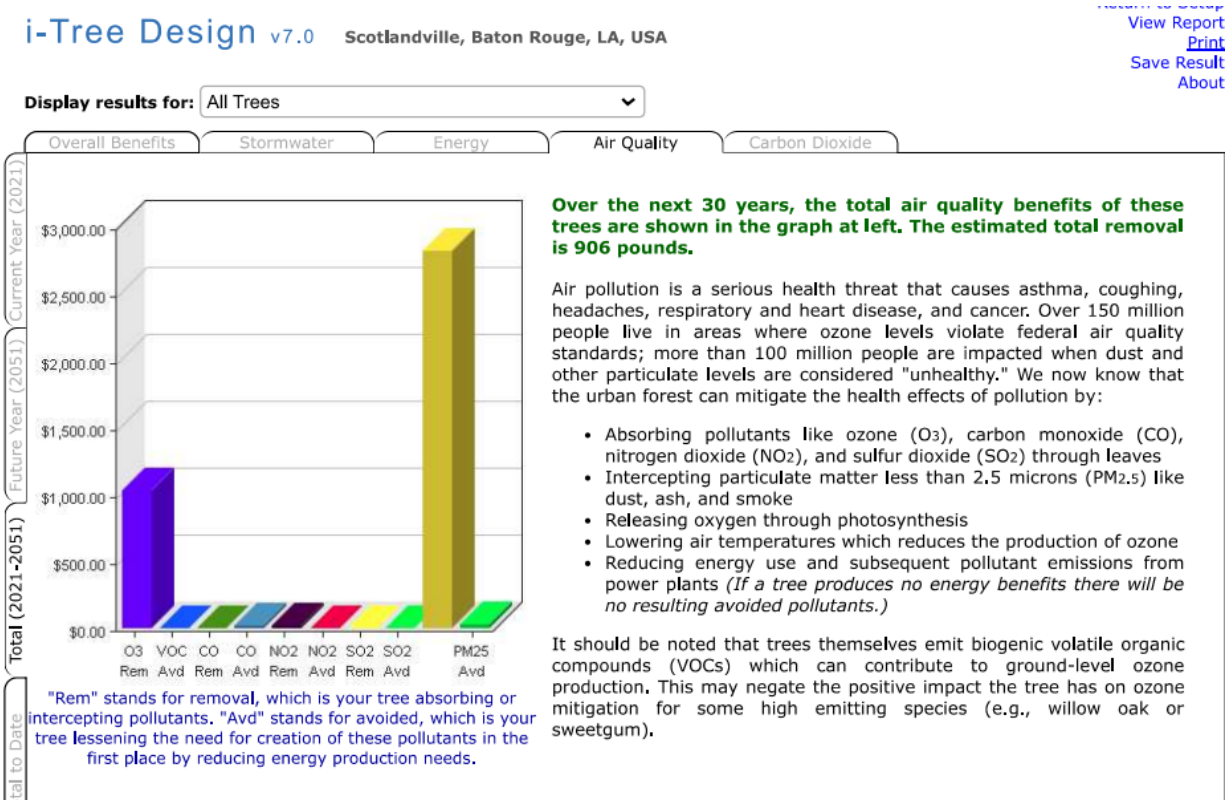


Fig 6: Air quality report for Live oak

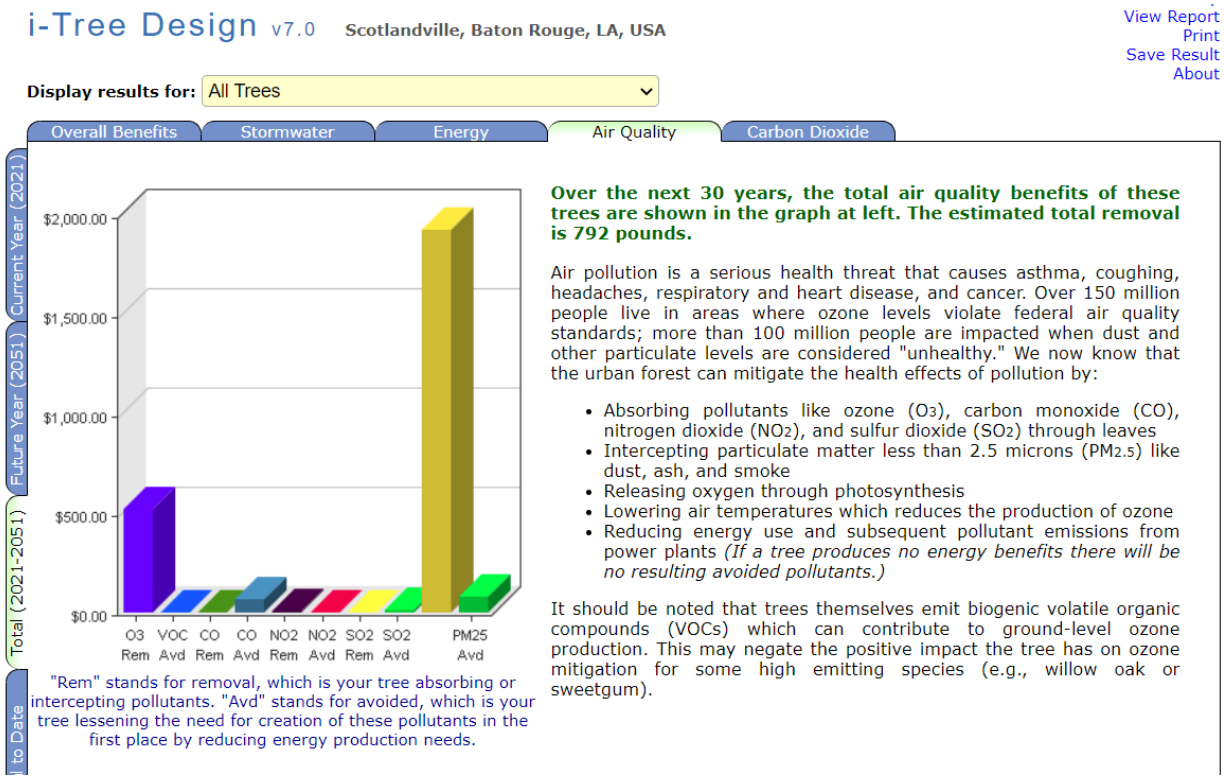

Fig 7: Air quality report for  Red Maple

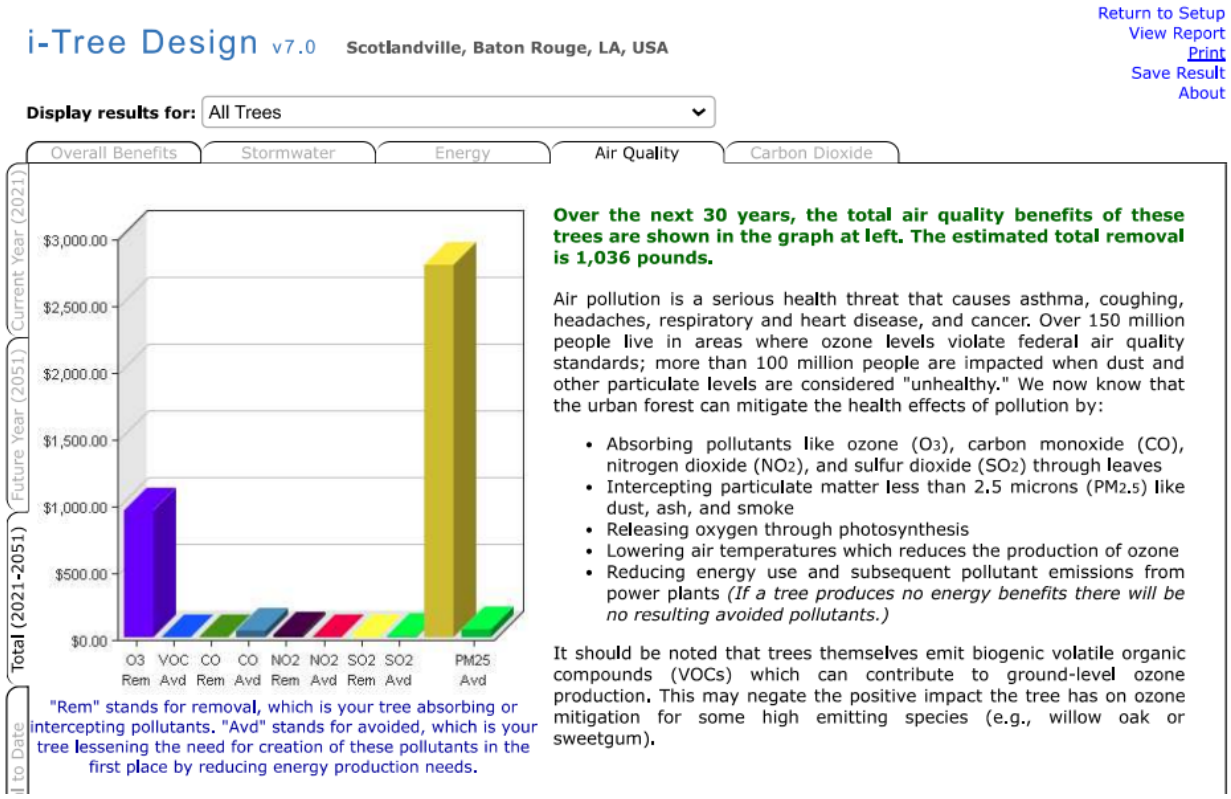


Fig 8: Air quality report for all the three species plotted together

## Discussion

Figure 1-3, shows the Carbon storage potential of 26 (1 inches) Big leaf Magnolia, Live oak, Red maple tree species respectively plotted around two buildings in Scotlandville to assess the potential contribution of this trees to store carbon as a means to mitigate and improve air quality. From finding, it shows that of the tree species considered, Live oak( *Querus virginiana*) seem to have the highest carbon storage potential. The carbon storage potential is important when considering tree species to be planted for air pollution mitigation. The tree species which have the ability to store and sequester atmospheric carbon will be considered to have a high potential to mitigate against air pollution. Live oak is followed by Red Maple (*Acer rubrum*), and lastly big leaf Magnolia. Noteworthy however, is that red maple although have lower overall carbon storage potential than Live oak, seem to have higher ability to avoided carbon emission, in terms

of reducing heat and air condition demands and thereby avoiding emission that would have accumulated otherwise. Since the trees were all plotted in the best available location in all scenarios, the se may be associated to other factors such as growth rate.

Also, Fig 4 shows the Carbon storage potential of 35 (1 inches) tree species plotted around two buildings in Scotlandville to assess the potential contribution of this trees to air pollution mitigation in order to select best specie or best species combination. Big leaf Magnolia, Live oak, and Red maple were combined in ratio 16:10:9. The result shows that although diversity may increase the tree species resilience, however ,in this scenarios diversity does not seem to have any effect on carbon storage potential. Although, this have not been statistically proven.

Figure 5-7 shows the air quality improvement potential of 26 (1 inches) Big leaf Magnolia, Live oak, Red maple tree species respectively plotted around two buildings in Scotlandville to assess the potential contribution of this trees to air pollution mitigation in order to select best specie or best species combination. The result shows that Live oak have the highest potential to mitigate air pollution in Scotlandville, East Baton-rouge and thereby improve air quality.  While Red maple have the highest avoided emission potential. Also, although diversity may increase the tree species resilience, however, in this scenarios diversity does not seem to have any effect on air quality improvement potential as an average for each tree is lower than average of Live oak or Red maple. Although, this have not been statistically proven.

Figure 8 shows the air quality improvement potential of 35 (1 inches) tree species plotted around two buildings in Scotlandville to assess the potential contribution of this trees to air pollution mitigation in order to select best specie or best species combination. Big leaf Magnolia, Live oak, and Red maple were combined in ratio 16:10:9. The result shows that although diversity may increase the tree species resilience, however ,in this scenarios diversity does not seem to

have any effect on air quality improvement potential. Although, this have not been statistically proven.

**Conclusion and Recommendation**

Red maple has the highest avoided emission potential if planted in Scotlandville, East Baton rouge, however overall Live Oak tree have the highest potential to improve air quality by storing atmospheric carbon, removing other greenhouse gases and pollutant and avoiding emissions to a certain degree. Hence, it is recommended that live oak trees be used judiciously during planting programs targeted to improve air quality of Scotlandville, East Baton Rouge, community dwellers. This project result shows that trees species have less air pollution removal ability when different tree species are planted. Nonetheless, the importance of tree diversity in Urban green spaces cannot be overemphasized, thus diversity in planting project is greatly encourage. However, making sure to select trees with considerable high air pollution removal storage. With these, it is recommended that at least Red maple and live oak trees, both of which are native to Baton-rouge be used for tree planting project.