



INTERCROPPING PAULOWNIA & AVOCADO TREES GROWN WITH ENGINEERED ROOTSTOCK



Phil Cruver, Founder & CEO
phil@regenbiomass.com
562-544-7410
www.regenbiomass.com



RegenBiomass developed a pilot project during 2022 in the desert of Southern California, funded by a USDA grant.

- ▶ **This project showcased the potential of fast-growing and regenerative paulownia trees for producing valuable lumber, afforestation/reforestation, and decarbonization on marginal lands.**
- ▶ **Research shows that intercropping paulownia and avocado trees has synergistic economic and ecological benefits, particularly when employing modern biotechnology for producing rootstock with selected traits having tolerance to heat, draught, and salinity.**
- ▶ **A pilot project is being proposed to prove the potential of these innovations for the reforestation of African forests and the afforestation for the Great Green Wall Initiative.**

► The Great Green Wall Initiative proposes an 8,000-kilometer wall of trees across the entire width of Africa. Led by the African Union, this initiative was conceived to combat desertification and hold back expansion of the Sahara by planting a wall of trees stretching across the entire Sahel.

► The modern green wall has evolved into a program promoting water harvesting techniques and improving indigenous land use techniques.

► The Sahel population of 135 million today is projected to reach 330 million by 2050 needing food, fuel, and jobs.





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- ▶ Paulownia are the fastest growing trees on the planet reaching 20 feet in the first year and can be harvested for timber in the fifth year.
- ▶ Furthermore, Paulownia trees are regenerative so that when the trees are coppiced for harvesting, they will continue growing back for harvesting every five years.
- ▶ Moreover, because Paulownia trees grow so fast, they sequester massive amounts of carbon dioxide estimated at 5 to 10 times that of other trees depending on the species.
- ▶ Therefore, Paulownia are ideal for afforestation of the Sahel and for reforestation and areas of Africa that have been devastated by deforestation.

► The Global Avocado Market has experienced significant growth in recent years, driven by increasing demand from consumers for healthy and natural foods. According to market research reports, the global avocado market was valued at USD 13.4 billion in 2020 and is expected to reach USD 21.5 billion by 2027, growing at a compound annual growth rate (CAGR) of 6.8% from 2020 to 2027.

► In recent years, African countries such as Kenya, South Africa, and Tanzania have emerged as major avocado producers. Kenya is the largest exporter and is already among the global top 10. Export revenues in Kenya surged by a third between 2019 and 2020. Farmers are hailing the crop as an antidote to poverty in rural areas.



Paulownia trees are fast-growing and have deep roots that can help to improve soil structure and increase soil fertility. They also can fix nitrogen, which can help to reduce the need for synthetic fertilizers. The large leaves provide shade during hot summer months and, as a deciduous tree, shed their leaves for allowing full sunlight for for the avocado trees during the winter.

Avocado trees, on the other hand, have a shallow root system and require a more fertile soil to grow well. By intercropping avocado trees with paulownia trees, farmers can benefit from the nutrient-rich soil created by the paulownia trees, while also maximizing the use of the land by growing two crops simultaneously.

Intercropping avocado and paulownia trees can have important environmental benefits. The trees can help to reduce soil erosion, improve water retention, and mitigate climate change by sequestering carbon dioxide. This can contribute to the Net Zero goals of Africa and the Great Green Wall initiative by promoting sustainable land management practices while reducing the impact of climate change.



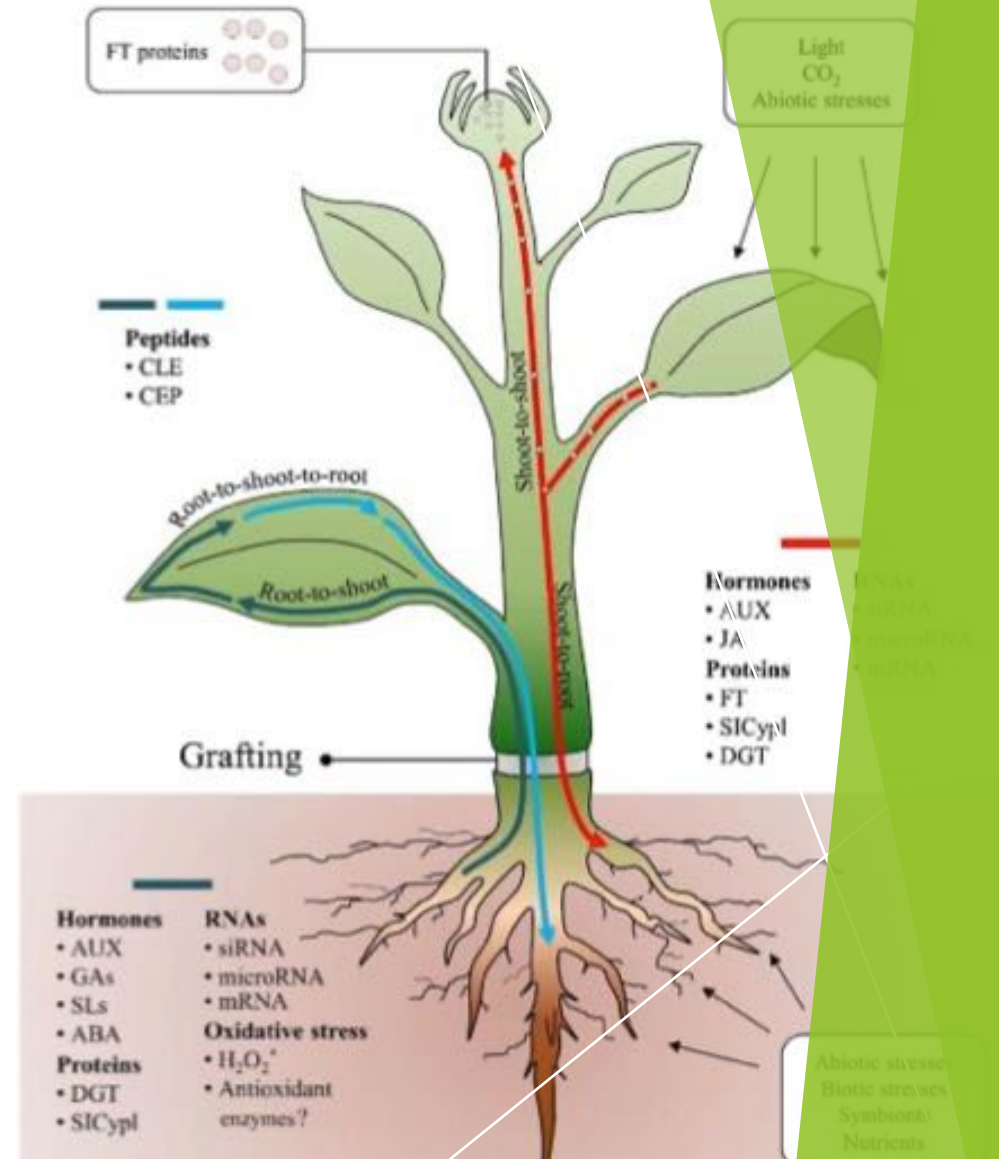
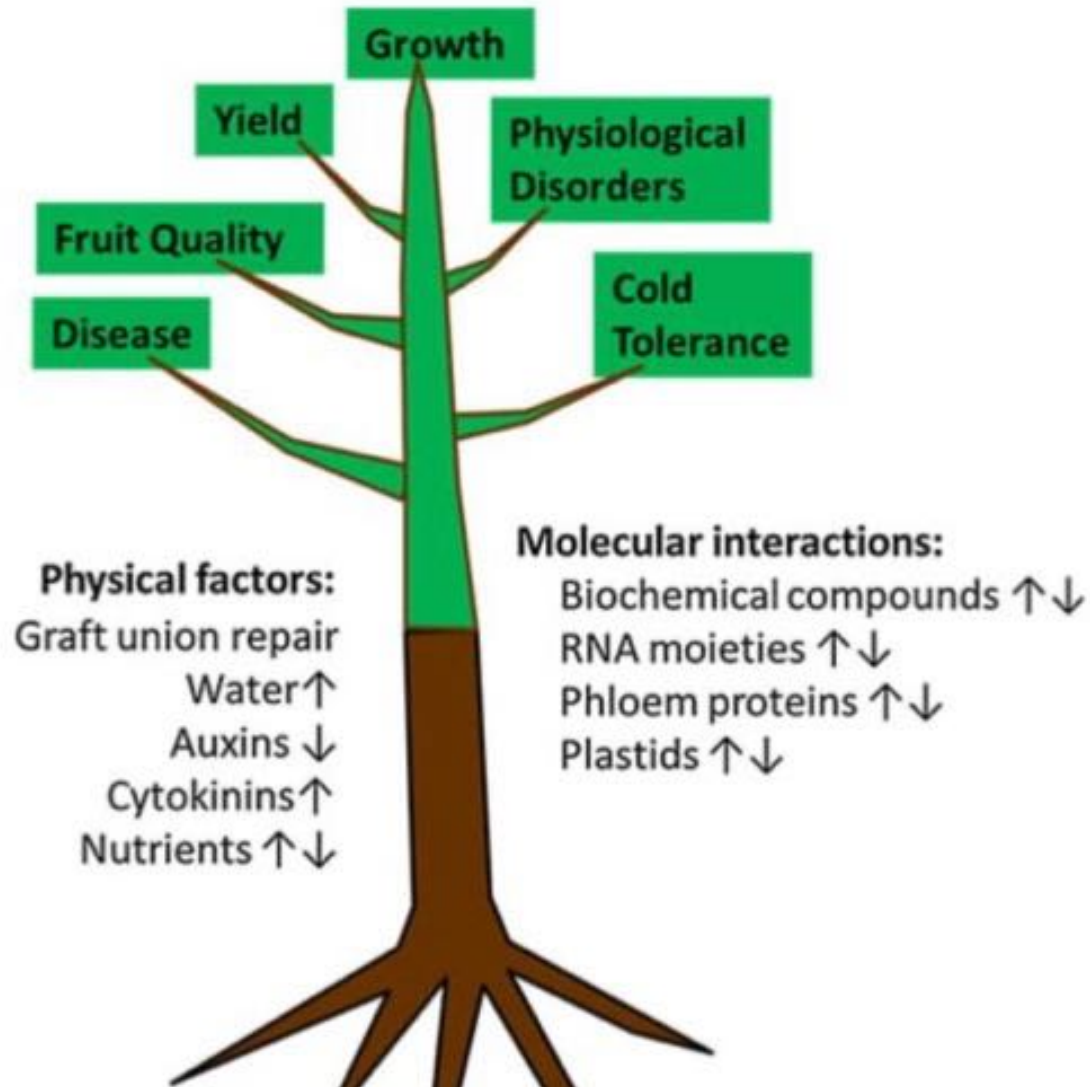
Advances in biotechnology are being used to develop new rootstocks with desirable traits. For example, researchers are using gene editing techniques such as CRISPR-Cas9 to produce rootstocks with improved disease resistance.

These latest advances in rootstock genetics and breeding are focused on developing new varieties with improved productivity, disease resistance, more tolerant to temperature, drought, salinity and adaptability to different environments.



Rootstock engineering to improve growth performance and still able to produce non-GMO fruits

Source: greenvenus.com





- ▶ It is estimated that paulownia and avocado trees can sequester about 50 tons of carbon per acre per year and that does not include the carbon sequestered from the soil with the tree's root structure.
- ▶ Soil probiotics can also pull up over 100% more atmospheric carbon into the soil than nontreated plants amounting to an additional 4-8 metric tons of carbon dioxide equivalents per acre in one year. The tree roots forge chemical partnerships with microbes and fungi to take up extra nitrogen and phosphorus needed to balance additional carbon dioxide intake.
- ▶ Improved breeding with bioengineering can further increase the carbon stored in the root structure.



Regenbiomass brings a new dimension for transforming the multi-billion avocado, lumber and decarbonization markets with innovations for:

Synergistic intercropping paulownia and avocado on marginal lands for local food security, jobs and exports.

Proprietary bioengineering of root-stock propagation more tolerant to temperature, drought, salinity, and insects requiring fewer inputs from toxic herbicides and polluting fertilizers.

Pioneering methodologies for the Voluntary Carbon Market for the carbon sequestration capability of paulownia and avocado trees as a nature-based solution for combating climate change.