

Brett M. Hundley, CFA President brett@agroforestrypartners.com

The Power of Trees

KEY TAKEAWAY

Trees are a great resource for removing carbon from the atmosphere. This isn't their only value, however. When they are commingled with agricultural crops and livestock, trees do so much more for the planet, its people, and our food sources. For instance, studies show that agroforestry practices – the intentional mixing of trees with crops and animals – can reduce soil erosion by 40%, on average. Soil erosion is a major problem in the United States today, with the country losing half its topsoil over the past 100 years. At current erosion rates, the U.S. could potentially run out of topsoil within 60-100 years. Without soil, there is no food. Trees also help to increase biodiversity and crop yields, while adding greater nutrient profiles to our food products. They improve drinking water quality for communities and help lower input costs and consumption of items like fertilizer and pesticides for farmers. In this research note, we detail the vast importance of trees for the agricultural sector and the people that rely on its products.

KEY POINTS

Carbon Sequestration. Trees do a great job of removing carbon from the atmosphere, with the *Arbor Day Foundation* estimating that one mature tree will absorb over 48 pounds of carbon dioxide in one year. This is, in fact, their actual job, as all plants engage in photosynthesis by taking in carbon dioxide from the air and matching it with sunlight, water, and nutrients from the soil to grow and produce natural resources for society. Plants release oxygen during this process, and they also push carbon into the soil in return for nutrients. Between the carbon sucked in from the atmosphere and that stored in soils, estimates are that agroforestry practices can sequester 2 to 5 tons of carbon per acre per year. This is the equivalent of ~8 barrels of oil being consumed in the market.

Soil Erosion. American soils have been eroding by roughly 4.6 tons per acre per year for much of the 21st century, with ~40% of this coming from water erosion and ~60% coming from wind erosion. Over the past 100 years, the country has lost roughly half of its topsoil. It takes soil a considerably long time to regenerate, based on natural processes associated with rock weathering and plant/animal decomposition. Perennial tree roots go deep into the soil and help to bind it together relative to shallow annual plant roots like corn and soybeans that are ripped up each year. Studies show that agroforestry practices can reduce total soil loss by roughly 40%, on average.

Food Nutrition. The mineral content (phosphorous, iron, calcium, vitamin C, vitamin B2) in the average U.S. vegetable has fallen by 5%-40%, relative to 1950. Plants get their nutrients from the soil, which in turn requires limited tilling and symbiotic cooperation between plant roots and fungi/microbes underground. When repetitive annual cropping practices are combined with intensive tilling, soils lose their microbiology associated with organic matter and become degraded in their ability to provide nutrients to plants. Trees help to stabilize soils and cycle nutrients with other plants, according to studies that show a 30% increase in soil microbiological activity and thus increased plant nutrient uptake for many crops.

Water Pollution. Agricultural runoff of fertilizer applied to fields is the leading cause of water quality impacts to U.S. rivers and streams, and the third leading source for lakes. In fact, roughly 60% of nitrogen fixed by human activities (fertilizer) is released back into the environment without being incorporated into food. Healthier soils hold more water, with agroforestry studies showing water absorption rates increasing by up to 500% and nutrient runoff/leaching rates decreasing by 20%-50%.

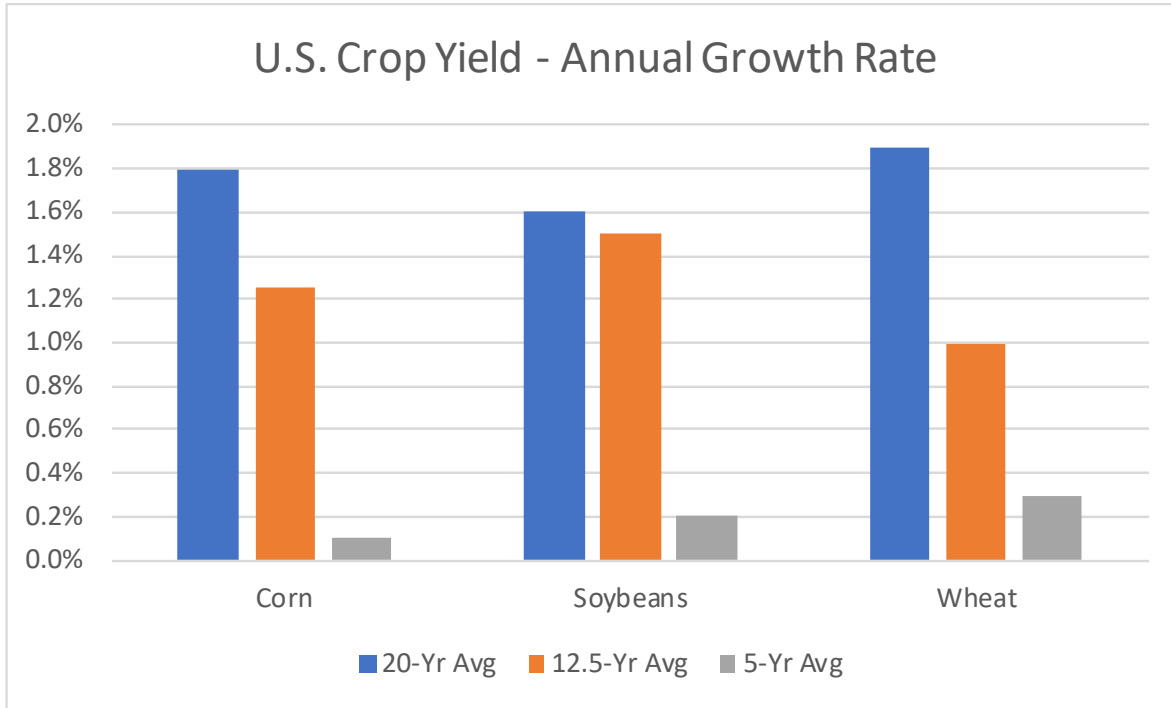
Biodiversity and Crop Yields. Biodiversity helps to purify our air and water, produce oxygen, decompose waste, and create medicine, all while pollinating plants and producing food for society. Agriculture is the leading driver of biodiversity loss today, the effects of which are starting to turn back on the sector itself. As **Exhibit 1** shows, U.S. corn, soybean, and wheat yields are starting to see their growth rates moderate, in part because of negative biodiversity impacts and declining soil health. Agroforestry can improve pollinator populations and nesting densities by up to 50% while also leading to crop yields that are 5%-50% greater, on average.

Farm Income. Healthier soil requires less dependence on chemical fertilizers because added nutrients are already in the ground. Agroforestry practices can lead to upwards of 50% greater nitrogen retention on-farm, reducing the need for commercial fertilizer application. This saves money for farmers. The addition of fruit and nut trees can also help stabilize/improve a farmer's income by way of offering a differentiated crop for sale to the marketplace. Multiple studies from around the world have shown farmer incomes rising anywhere from 15%-100% when agroforestry practices are added to conventionally monocropped fields.

ADDITIONAL DISCUSSION

Overall U.S. crop yields have been rising steadily for decades. However, yield growth rates on staple crops like corn, soybeans, and wheat have been slowing more recently. As **Exhibit 1** shows, U.S. corn yields have dropped from a 20-year average growth rate of 1.8% down to roughly flat over the past 5 years. U.S. soybean yields have dropped from a 20-year average growth rate of 1.6% down to 0.2% over the past 5 years. And U.S. wheat yields have dropped from a 20-year average growth rate of 1.9% down to 0.3% over the past 5 years. This is concerning, given that global food demand is expected to potentially double over the next 50 years. Soil erosion represents an ongoing headwind for farmers and society overall, as current U.S. soil erosion rates are measured to negatively impact crop yields by 0.4%, on average, per year. Some regions of the country face meaningfully higher yield impacts, relative to others.

Exhibit 1: Historical U.S. Crop Yield Growth Rates



Source: USDA

Important Disclosures

This report is provided for informational purposes only and is intended solely for the person(s) to whom it is delivered. This report is confidential and may not be reproduced in its entirety or in part, or redistributed to any party in any form, without the prior written consent of Agroforestry Partners LLC (the “Company”). This report was prepared in good faith by the Company for your specific use and is being provided solely for purposes of discussion to assist you in determining whether you have a preliminary interest in making an investment in the Company. Information contained in this report is current only as of the date specified in this report, regardless of the time of delivery or of any investment and does not purport to present a complete picture of the Company, nor does the Company nor the Manager undertake any duty to update the information set forth herein.

This report does not constitute an offer to sell or the solicitation of an offer to purchase any securities, including any securities of the Company. Any such offer or solicitation may be made only by means of the delivery of a limited liability company agreement, subscription agreement and related disclosure statement, which will contain material information not included herein regarding, among other things, information with respect to risks and potential conflicts of interest, and other offering and governance documents of any given fund or account (collectively, the “Offering Documents”). The information in this report is qualified in its entirety and limited by reference to such Offering Documents, and in the event of any inconsistency between this report and such Offering Documents, the Offering Documents shall control. This report should not be used as the sole basis for making a decision to invest in the Company. In making an investment decision, you must rely on your own examination of the Company and the terms of any offering. You should not construe the contents of this report as legal, tax, investment or other advice, or a recommendation to purchase or sell any particular security.

Past results are not necessarily indicative of future results and no rereport is made that results similar to those discussed can be achieved. An investment in the Company may lose value. Investment results will fluctuate. Certain market and economic events having a positive impact on performance may not repeat themselves. Past results may be based on unaudited, preliminary information and are subject to change.

The information included in this report is based upon information reasonably available to the Company as of the date noted herein. Furthermore, the information included in this report has been obtained from sources the Company believes to be reliable; however, these sources cannot be guaranteed as to their accuracy or completeness. No rereport, warranty or undertaking, express or implied, is given as to the accuracy or completeness of the information contained herein and no liability is accepted for the accuracy or completeness of any such information.

In calculating targeted returns, the Company utilizes certain mathematical models that require specific inputs that, in some cases, are estimated, and certain assumptions that ultimately may not hold true with respect to any investment. These estimates and assumptions may cause actual realized returns to deviate materially from modelled expectations. The targeted returns are calculated net of all management fees, incentive fees/allocations, if any, investment-level and entity-level expenses. These models, including the estimates and assumptions, are prepared at a specific point in time and reflect conditions at such time. The targeted returns are premised on several factors, which are uncertain and subject to numerous business, industry, market, regulatory, competitive and financial risks that are outside of the Company’s control. There can be no assurance that the assumptions made in connection with the targeted returns will prove accurate, and actual results may differ materially, including the possibility that an investor will lose some or all of its invested capital. No assurances can be made that targeted returns will correlate in any way to past results, and no rereport is made that results similar to those shown can be achieved. The inclusion of the targeted returns herein should not be regarded as an indication that the Company or the Manager considers the targeted returns to be a reliable prediction of future events, and the targeted returns should not be relied upon as such.

This report outlines the planned or expected characteristics of the Company; however, the Company is in a structuring phase and there may be material changes in the market or to the structure and terms of the Company prior to any interests in the Company being offered. No assurance can be given that any investment objectives discussed herein will be achieved.

This report may contain certain opinions and “forward-looking statements,” which may be identified by the use of such words as “believe,” “expect,” “anticipate,” “should,” “planned,” “estimated,” “potential,” “outlook,” “forecast,” “plan” and other similar terms. All such opinions and forward-looking statements are conditional and are subject to various factors, including, without limitation, general and local economic conditions, changing levels of competition within certain industries and markets, changes in legislation or regulation, and other economic, competitive, governmental, regulatory and technological factors, any or all of which could cause actual results to differ materially from projected results.