



TRIBINE and Carbon Sequestration

We can help with that.

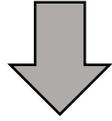
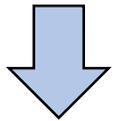
Executive Summary, April 2019

Bob Matousek, Vice President of Engineering of Tribine Harvester, Inc.

Nature has established a process for recycling sunlight, water and carbon dioxide, and is called **PHOTOSYNTHESIS**

It really works great!

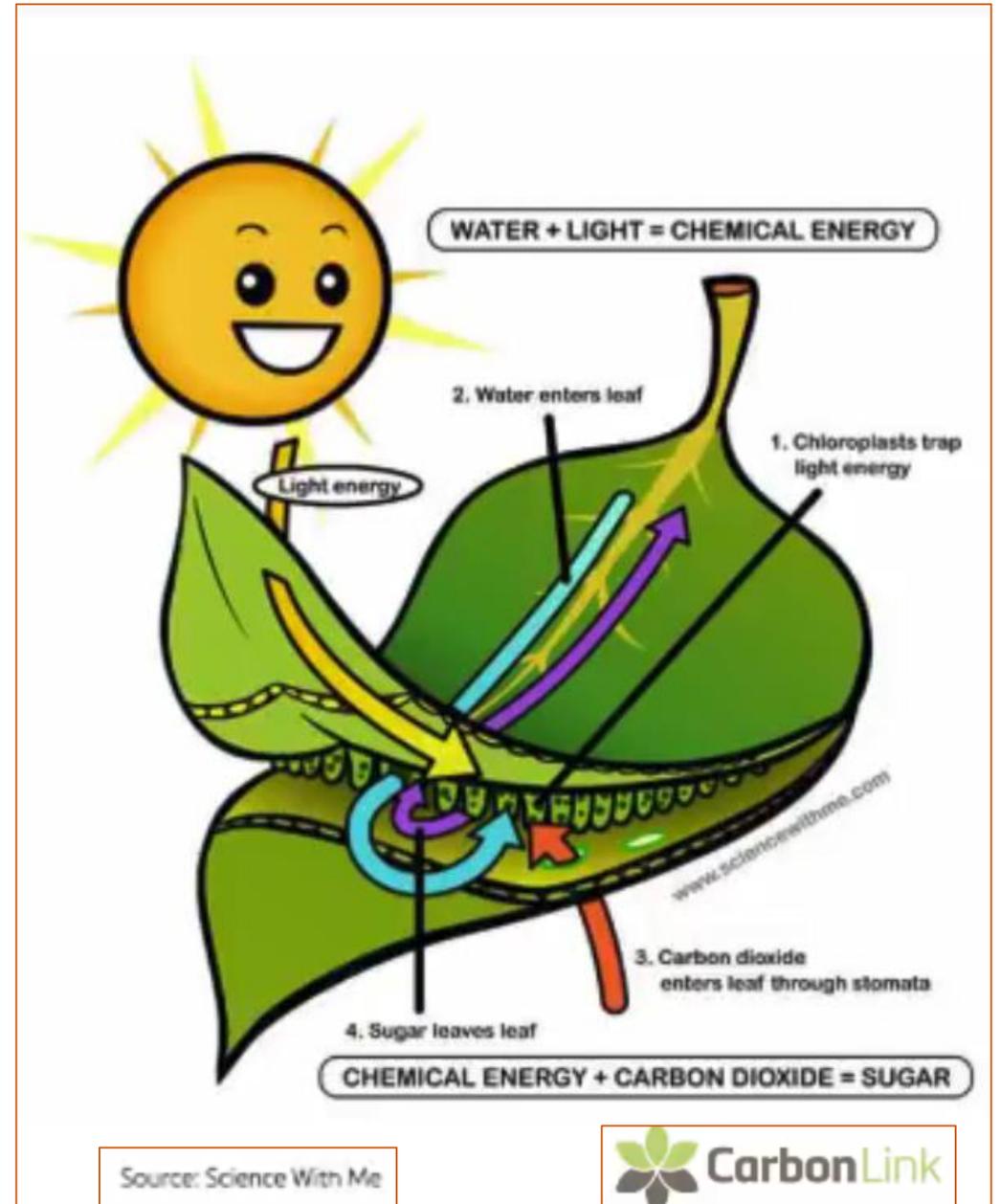
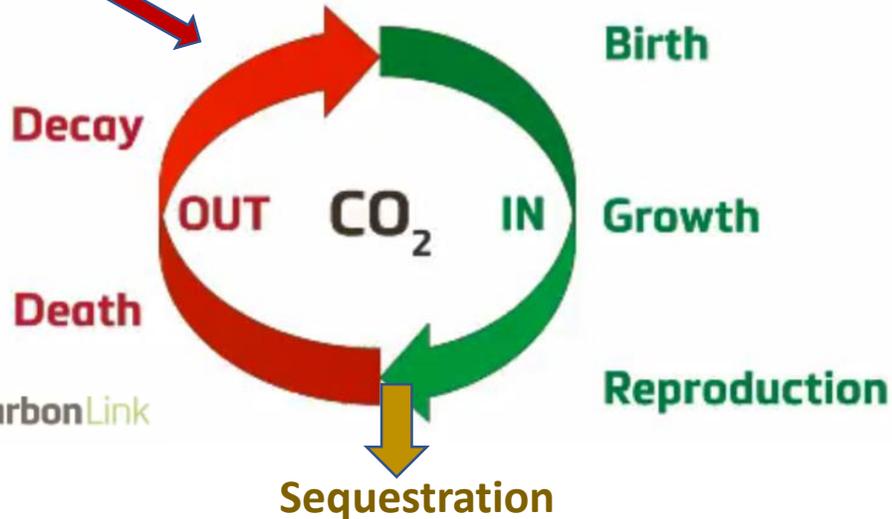
Sunlight, Water, and Carbon Dioxide into the “reactor”



Oxygen (O₂) out to atmosphere; Carbon (C) into **biomass** and into the **soil** via roots as glucose.

The Carbon Cycle

Combustion CO₂



The science and politics of the world is currently seeking a solution to mitigate the emissions caused by the combustion of stored fossil fuels. That solution should be *forever sustainable* for everyone in a legitimate sense, **helping the producers as much as the consumers.**

It is time to rationally ask - - *“How ??!”*

The **Carbon Cycle** shows that as we raise crops for food, we are also sequestering Carbon in the soil while returning Oxygen to the atmosphere, and that is great - - while the plants are growing. But after the harvest is gathered, we till up the soil to prepare for the next crop; the act of allowing most/all of the Carbon to be returned to the atmosphere as CO₂.

Obviously, we need to *stop tilling the soil and releasing the Carbon.*

There is a way of doing this that is gaining popularity among the informed, innovative farmers of the US and the world. In its most basic form it is called **NO TILL Farming**. Planting the next crop in the residue left by the previous crop, not mixing it back into the soil. Not disturbing the Carbon in the soil nets a “permanent” sequestration of about **1.4 TONS/ACRE** of Carbon in the soil, removing about 5 tons/acre of CO₂ from the air.

More importantly, the sequestered Carbon can significantly improve the soil health and enhance food production.

What is unwanted in our atmosphere is highly coveted by our soil.

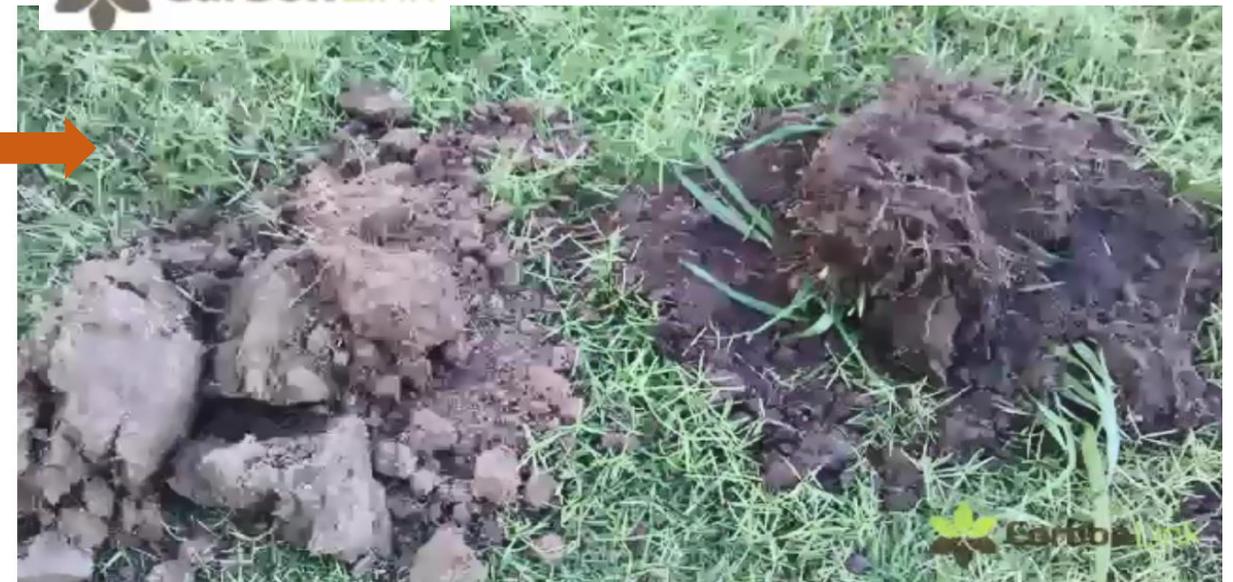
These two pictures show the answer is within our grasp.

The top picture shows that by managing crops for carbon sequestration, carbon can be sequestered in the soil (black soil) better than unmanaged areas. To an Agriculturist, the dark black means much more fertility and much more productivity.

The bottom picture contrasts enhanced bio-managed soil on the Right vs the typically managed soil on the Left. Again, blacker is better, much better.

On the right, carbon rich, healthy soil
On left, depleted soil with lower organic matter

So with absolute probability Ag can say that if we could sequester a lot of this Carbon that is worrying you, we could become more sustainable and more profitable in return.



What does this have to do with the TRIBINE?

Simply stated: The **TRIBINE Harvesting System** can remove some of the biggest roadblocks in the mindshare transition from Conventional Tillage Agriculture to No-Till based systems that use Cover Crop Technology. We can begin upping the carbon sequestration while simultaneously improving crop production. We can also lower the inputs costs while doing so.

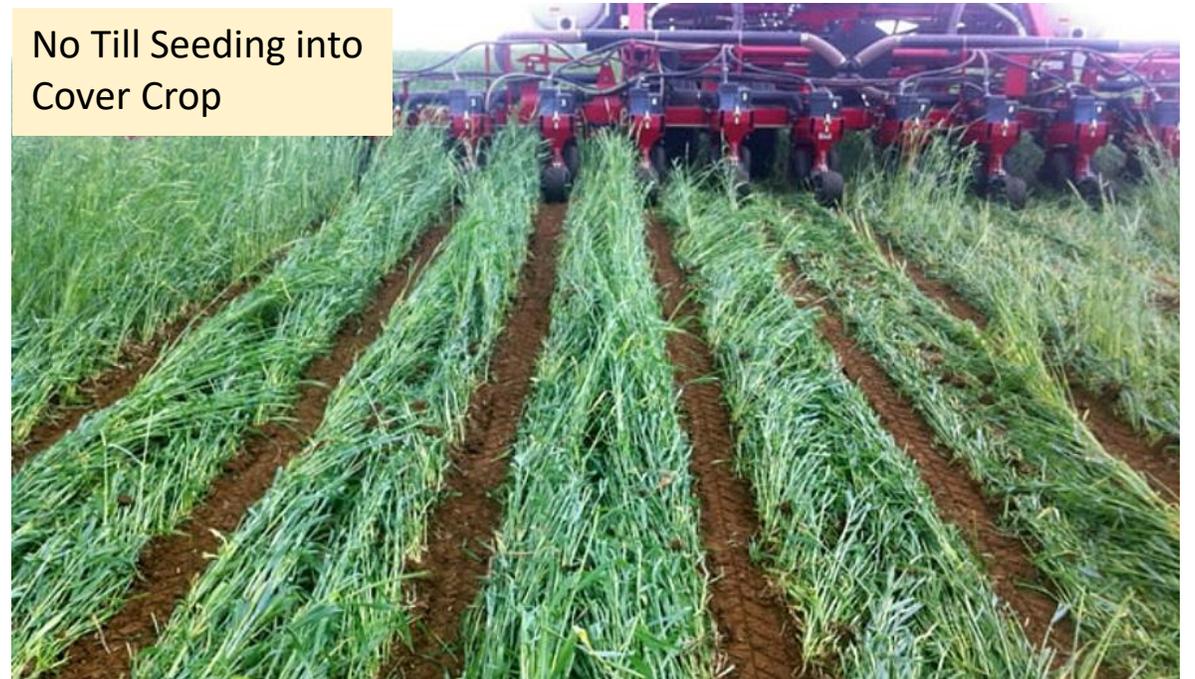
That is a WINNING proposition.



No Till Soybeans
into corn residue



No Till Seeding into
Cover Crop



From its inception, **TRIBINE Harvester®** has placed high priority on sincerely reducing the amount of area that is compacted by the harvest operation. Tribine field operations on No Till fields over the past two years have shown our customers that we are truly accomplishing that goal when allowed to follow our rules. They also notice that we are not nearly as disruptive to the logistics flow of harvest as doubters had feared. The Tribine's architecture with **4 large driven tires** floats this machine in soft soils much better than dual-tired competitor machines with little tires on the rear.

Tribine has harvested continuously on fields that sink other machines and prevent operation. Plans are in the works that can make us even better at flotation, preventing any routine rutting of very soft fields.



In example, this (LH) picture from Texas the day after 2.5" rain shows Tribine imprint on left, and 4x4 ATV service buggy rut on the right.

(RH) Three days after 5" of rain in N Kansas, the no-till farmer asked us to proceed with cutting the whole field. The next morning, water rose 1/2" deep in the cleats. The field planted nicely that fall.



The exciting development in the story of Tribine's facilitating the switch to No Till farming in regions that currently believe they cannot because of field rutting is the subject of Tribine Harvester's latest patent grant by the US Patent Office.

(12) **United States Patent**

Patent No.: **US 10,231,371 B2**

Date of Patent: **Mar. 19, 2019**

(54) **SOIL COMPACTION MITIGATION ASSEMBLY AND METHOD**

(71) Applicant: **Tribine Industries LLC**, Logansport, IN (US)

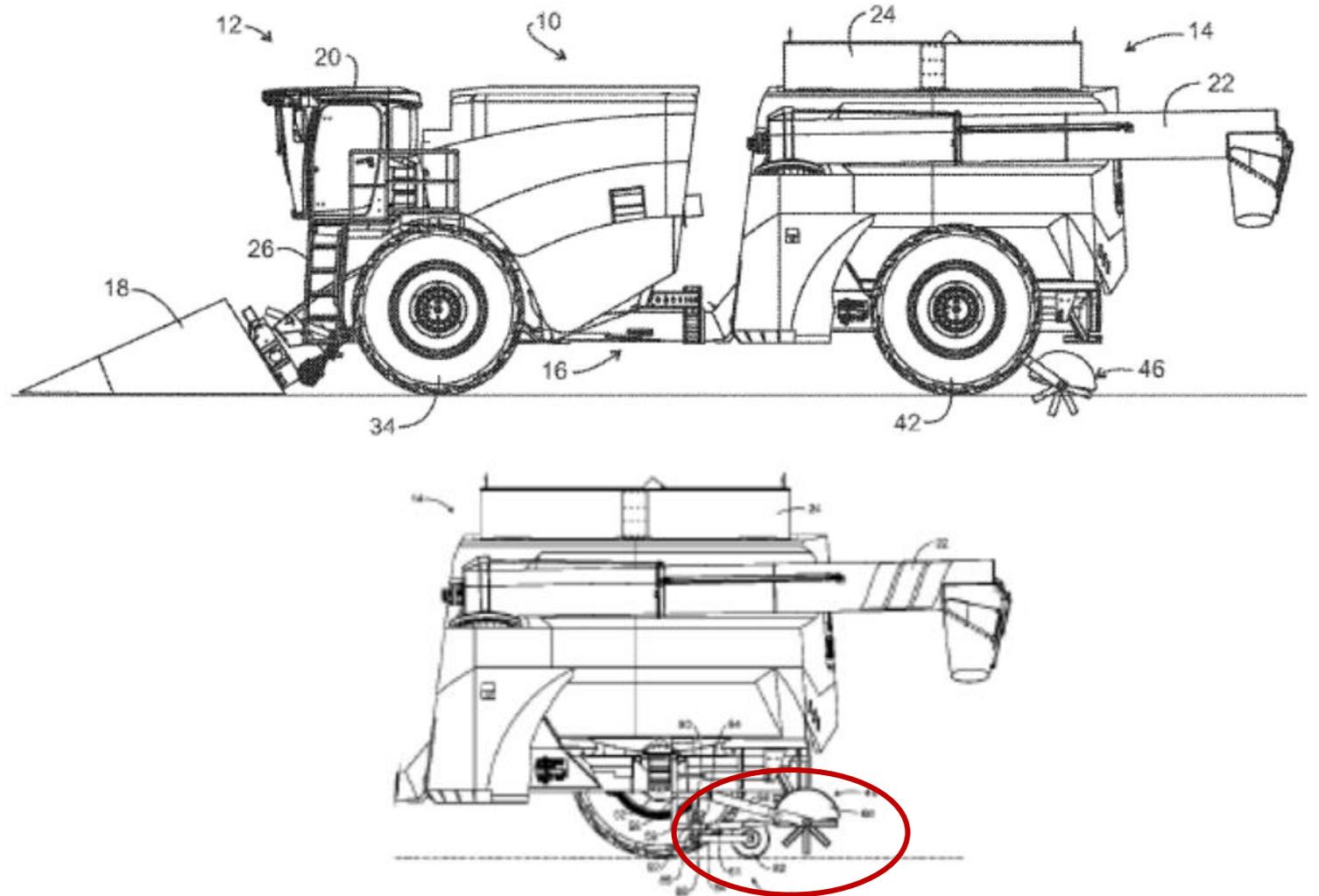
(72) Inventor: **Ben N. Dillon**, Logansport, IN (US)

(73) Assignee: **Tribine Industries LLC**, Logansport, IN (US)

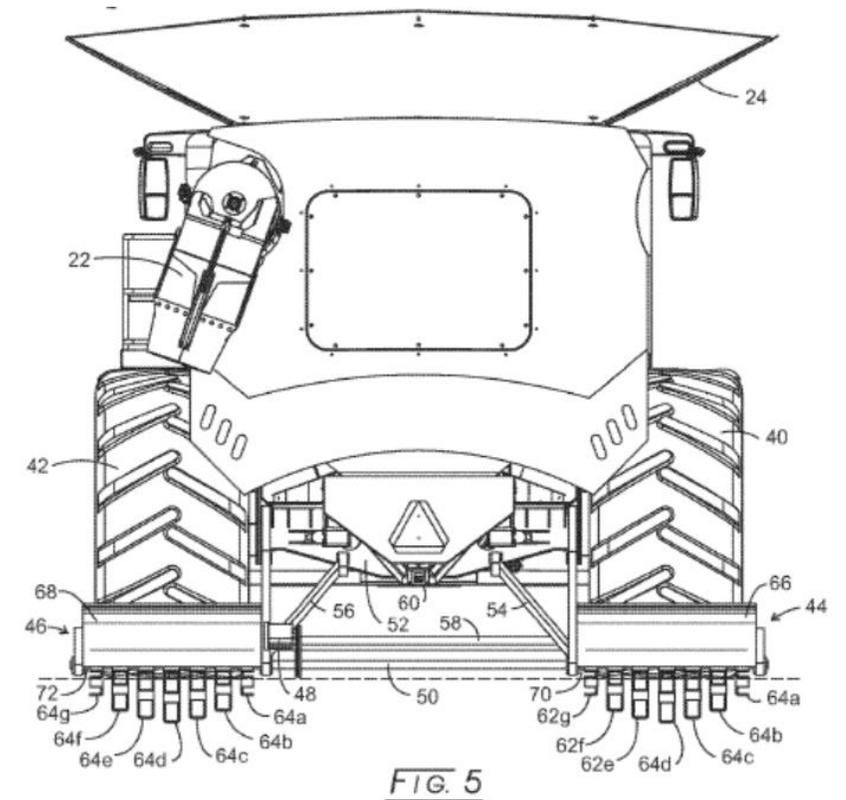
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 35 days.

(21) Appl. No.: **15/636,728**

(22) Filed: **Jun. 29, 2017**



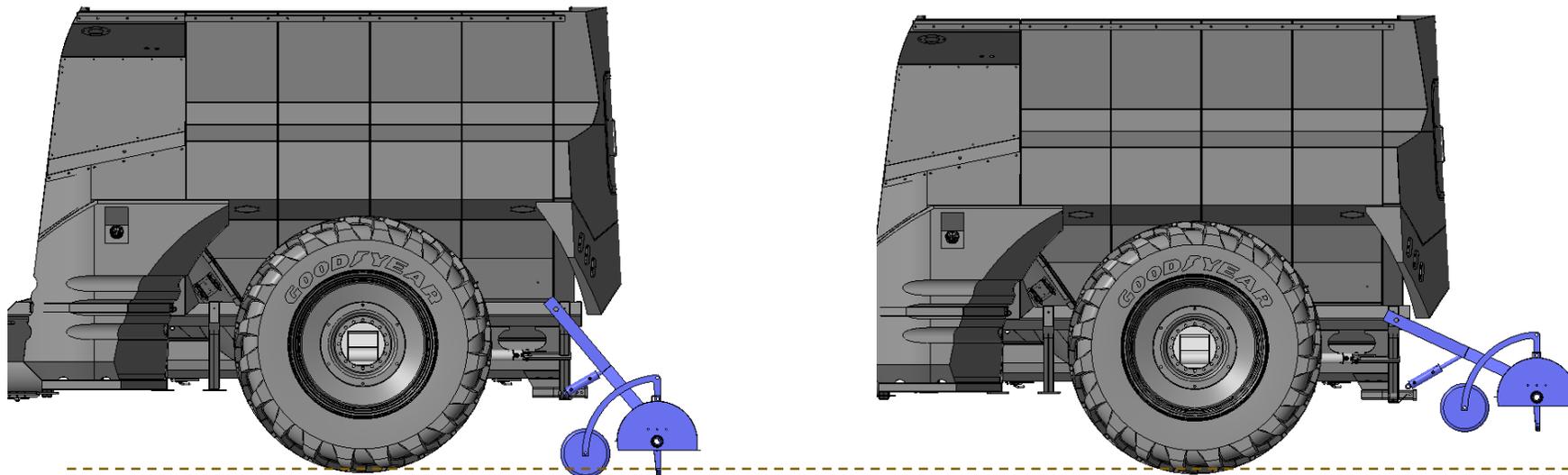
The core of the invention is the parabolic shape of the depth of the rotary tiller blades, allowing the middle to dig deeper while still allowing the outside of the swath to knock down the ridge pushed up by the tires in very soft field conditions. Shown below is a RH track that looked like the LH rutted track, but then the tiller returned it to level.



The power to turn the tiller can come from a dedicated smaller engine, or alternatively from one of the main engines via a hydro-static motor drive.

With this new opportunity a grower can make clear decisions on the condition of his field post-harvest. We do not have to work 100% of the surface of the field to thoroughly condition the 15 to 20% of the surface area that we had corrupted. **A real WIN for keeping most of the Carbon sequestered in the soil.**

- We can choose to not work the tire tracks when the soil is dry and firm and the Tribine is not leaving a track of any significance to hinder future planting, nor is it requiring a release of CO₂ via tillage
- We can choose to use the tiller to remove surface compaction in the tire tracks, while not disturbing the lower soils and the Carbon sequestration they have accomplished
- When we are making significant ruts in the mud, the tiller can work the ridges pushed up by the tires back down into the track to leave a level surface for future planting, giving up only a fraction of total Carbon because only the tracks are being disturbed, probably to a shallower depth than ripping.

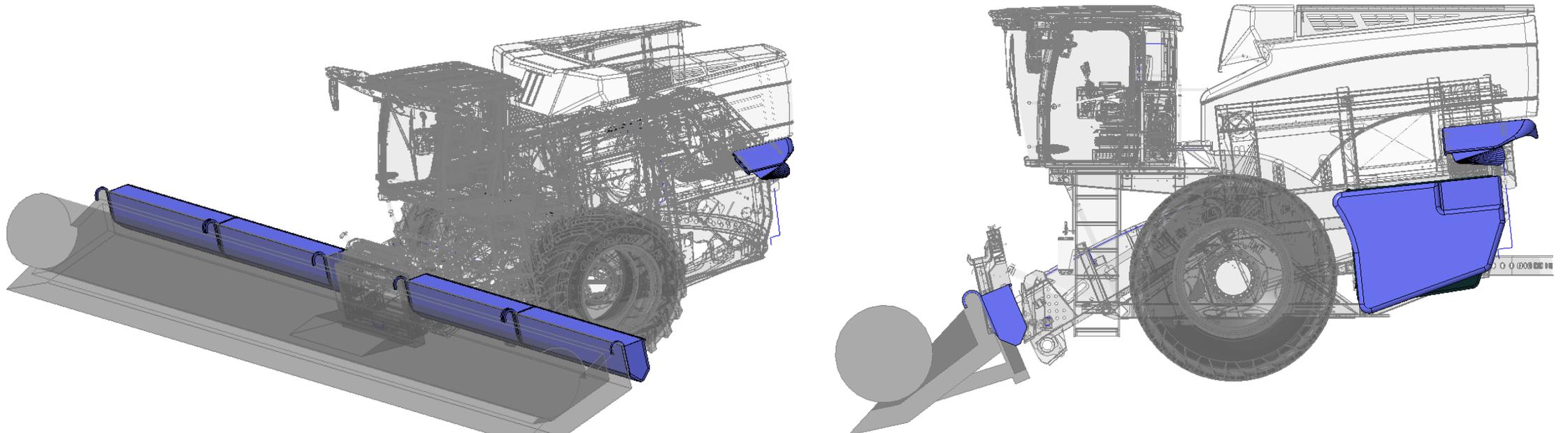


Being a believer in Cover Crop Technology, **TRIBINE** is looking ahead and asking how we can further service the needs of establishing the secondary crops.

Given our significant structural and tire carrying capacity, we are not taken aback by the thought of adding weight to the front chassis, or even the header/feeder components.

We can carry significant seed holding components, and necessary seed metering and dispersing hardware. We still would not approach the front tire weights of major competitors with only grain head and grain tank loads.

Our forward-favoring locations shown below are chosen wisely to allow that the seed for the following crop could be placed ahead of the straw chopper discharge. **We can mulch our own seeding at no cost!!** This will be a huge boon to **germination and establishment** of that second crop. More to come.



In Conclusion

This explanation of a system of crop production and atmospheric carbon sequestration into the soil is a fitting introduction to the many ways the Tribine Harvester® can be a contributing partner to an Ecological and Agronomic answer.



A system equally beneficial for food producers of the world and food consumers that become more numerous everyday. Let us record the features of the **TRIBINE Harvester®** that let it shine as a facilitator of the change we all need.

- With our large grain tank we can eliminate other-than-combine traffic in the field
 - We will know exactly where the compaction is located if we need to go get rid of it
 - Only the width of the tire tracks / width of header (i.e. 7' / 40') will be the % affected
- We can stay afloat in some historically unpassable soft, wet conditions and not cause a deep track
- We now have the **means of fixing the damage** that we may do in those outlier years of extreme wet
 - Low surface pressure means shallow depth of compaction; removable by our attachment if desired
 - Shallow compaction can be fixed with the proper cover crop root systems seeded at harvest
- Planting and spraying operations can sync onto our track widths for true controlled traffic and better yields
 - Less than 20% of the field need be trafficked
- Tribine can withstand the weight loading of additional equipment for cover crop or double crop seeding
 - Given that we know where the compaction is, we could seed compaction reparation crops only in tire tracks to give those areas relief w/o covering the entire field (why is up to you).
- We will develop the means to comfortably seed a second crop while harvesting the current one without trafficking the field with another machine, at minimal intrusion to the critical harvest operation.
- The newly patented (April '19) **Dual Straw Choppers** system meets or exceeds the chop and spread requirements of No Till

So the situation comes down to a very neat paradox that is the solution to a couple of big problems

- ➔ We are exhausting a lot of CO₂ from Fossil Fuel combustion into the atmosphere
- ➔ Plant life including Agricultural food production needs CO₂ to do its job
 - * The History of life on this planet shows that plants do better with more CO₂ vs less
 - * The future of human and animal life on the planet can do better with less CO₂ vs more
- ➔ Agriculture world wide needs to be incentivized to consume the CO₂ while simultaneously:
 - * Sequestering the Carbon permanently in the soil to enhance food production
 - * Returning the Oxygen to the atmosphere to stabilize the CO₂:O₂ ratio to avert climatic change
 - * Replenishing the Oxygen consumed in fossil fuel combustion



On that proposition, **TRIBINE can help!**

Thank you for your attention

