Regenerative agriculture doesn't have to be contentious

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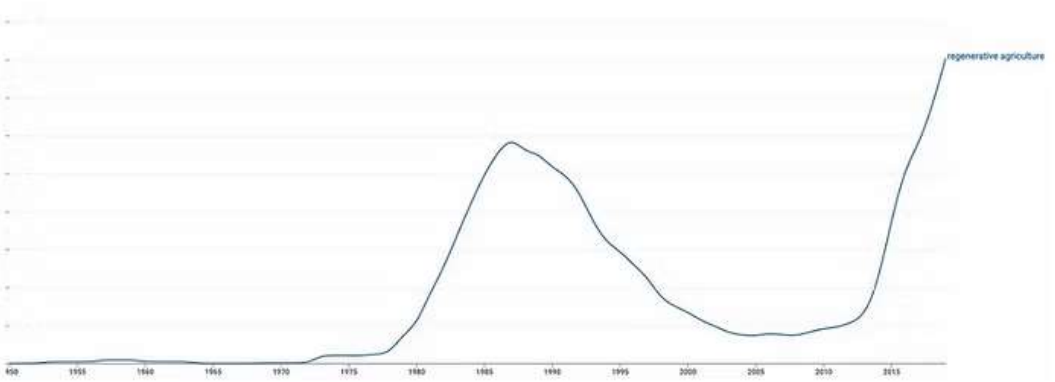
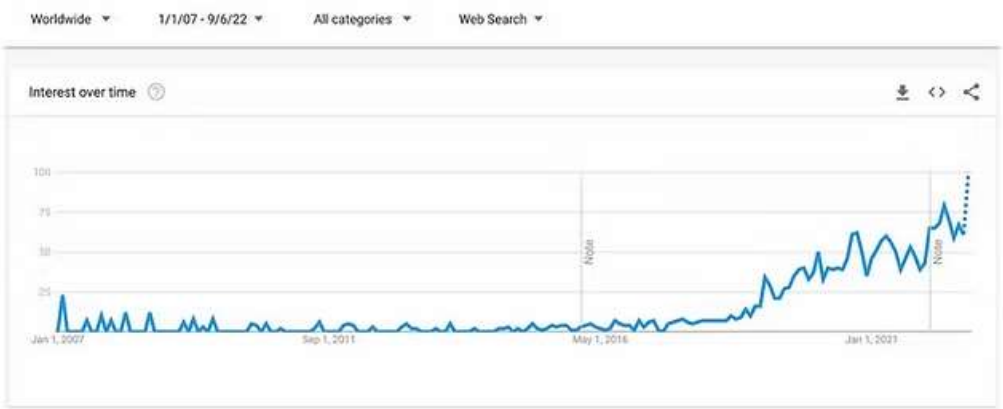
Canadian agronomist Shane Thomas unpacks the five component principles of regenerative agriculture, many of which, he notes, are already practised by conventional farmers. Using a simple scorecard, he asks: when does a 'conventional' farmer become 'regenerative'? From a farming perspective, what matters most should not be to appease a specific definition, but rather to focus on outcomes - optimising profitability and productivity while having the least environmental impact, he suggests.

Regenerative agriculture is increasingly talked about, albeit this isn't the first time it has been trending. Looking at Google's Ngram Viewer, we can see that it was frequently mentioned in books starting in the late 1970's and peaking in the mid 80's before gaining more mentions again in the early 2010's:



We see the more recent interest starting a bit later via Google Trends on a worldwide basis (Google search frequency):



It's easy to understand why the interest has grown in the last five years, with an ever-increasing emphasis on environmental impact across all industries, including agriculture.

But the regenerative ag concept has also attracted its fair share of controversy, mainly centred around the fact that as a system of farming it is poorly defined, and its outcomes therefore not properly understood.

What might be more instructive is to break down "regenerative ag" into its component parts and seek to better understand each of them, and where a farmer can implement small changes by field or farm rather than simply telling farmers to "be regenerative".

So what exactly is "regenerative ag"?

It is defined as the below according to the Rodale Institute.:

"a system of farming principles and practices that seeks to rehabilitate and enhance the entire ecosystem of the farm by placing a heavy premium on soil health with attention also paid to water management, fertilizer use, and more. It is a method of farming that "improves the resources it uses, rather than destroying or depleting them."

Essentially, it's a bundle of practices, many of which are commonly practised by "conventional" farmers already.

I'll dive into them, but then the question arises: When does someone get to be considered "regenerative"? Is it doing 2 of the practices? 3? 4? How well do you have to do them? Does it matter?

What practices and principles actually make up "regenerative ag?"

There are generally 4-5 principles, depending on the source you want to reference. Here is one source, Climate Reality Project and another, Groundswell Ag. I opted to take their views along with other resources and recombine them together into the following:

1. Minimise soil disturbance (no tillage or minimal tillage)
2. Crop diversity (crop rotation, intercropping etc)
3. Covered soil surface all year round (living crops for harvest + cover crops or crop residue covering soil all year)
4. Grazing animals on the land
5. Less additions of synthetic fertilisers and synthetic crop protection products

For the most part, I can agree all of these can not only be a good thing for the environment and soil, but a good thing for yields and profitability of the farmer (caveat: they need to be implemented effectively).

When one looks at these, there are a lot of these that conventional farms already do, depending on geography.

Each of these layers can be put on a continuum with a scoring system in order to decipher Poor, Good and Excellent (1-3-5) across a field/farm to better assess (obviously this is all arbitrary and could be more precise, but for today's purposes we will keep it simple):

1. No tillage = 5, minimum till = 3 and full tillage = 1
2. Annual intercrop (2+ crops in field at any given time in conjunction with rotating those crops year to year) = 5, three or more crops in annual rotation as a monoculture = 3 and less than two crops in rotation = 1
3. Cover crops and/or winter seeded crops in conjunction with rotation on >25% of land = 5, Winter crops occasionally and straw always left on top of soil with combine management to ensure proper spread = 3 and chopping, no winter crops/cover crops and poor straw management = 1
4. Grazing animals on all land = 5, Grazing animals on some land = 3, no grazing animals = 1
5. This is more difficult to assess, but we can start by saying: Biological based products to increase nutrient use efficiency, a soil testing plan to inform fertiliser applications, precision application practices, expert support for crop protection/fertiliser applications and a emphasis on crop protection EIQ = 5, Some of the above = 3, Almost none of the above = 1

In this made-up score card, 25 equates to a "perfectly regenerative farmer" and 5 essentially equals what I would say is a below average conventional farmer.

To assess this effectively is actually really nuanced as well, as we can see in bringing this score card to life below. I'll break down a "conventional farmer" I used to work with as an agronomist in Saskatchewan, Canada, who was considered an above average farmer in the area in terms of executing year to year and achieving high yields, but also would have been pretty typical in terms of practices used. We'll use the fictitious name of Jack, but the assessment is based on an actual farmer just with a different name.

1. Jack was a minimum tillage farmer, rarely using any actual tillage and using an air seeder with 3/4" of opener disturbance to seed and place fertiliser all in one application. Score = 3

2. Jack grew 6 different crops on a pulse - cereal - canola rotation. Never intercropping. Score = 3
3. Jack grew the odd winter wheat field and was very cognisant of his straw management. Score = 3
4. Jack had grazing animals on his pastureland (for simplicity, not included in this assessment), but did not incorporate them into his cropped land. Score = 1
5. Jack used the occasional biological, always soil tested and relied on experts to inform his decisions. He did not use any sort of EIQ system for crop protection decision making. Score = 3

Total Score = 13/25

What's needed to consider here is the fact that in order to "move up" in score level for some of these segments requires capital expenditure and a much more intense understanding of their operation and the level of support enabling it.

For example, if Jack wants to improve on crop diversity and implement intercropping there is a need (generally) to invest in sorting equipment. On top of this, he would need to do work to understand the best combinations (eg: maturity lines up for harvest or managed in some other way among many other things) of crops in his area along with other agronomic considerations like seeding rates, weed management, nutrition needs and more. In fact, something like seeding might require an extra pass with an RTK system to plant something like flax in between the rows of chickpeas. This would all have real economic implications for Jack on an annual basis meaning hesitancy to go down this route is justified in the short term even if there is economic and environmental upside long term.

It's worth remembering, a broke farmer is unlikely to be a regenerative farmer. Some practices, like say autumn-seeded cover crops need to be assessed in the context of the most limiting factor to produce a profitable crop too: if rain is a significant constraint, a that might not be the place to start!

The question then becomes, where does a farmer become "regenerative" and where are they conventional? Is it 25/25? 20/25?

Personally, I am not sure it really matters (unless they have contracts in place for premiums, land management etc). Farmers should reap incrementally beneficial outcomes for their farm from each point progression along each continuum and they can tailor priorities to the agronomic needs or current economics realities of their operation.

The goal shouldn't be to appease a specific definition, it should be to optimise profitability and productivity while having the least environmental impact. These illustrative practices allow for that while providing a guideline for those interested.

This is the benefit of breaking things down into their components: it changes the discussion from an "all or nothing" conversation to a "here's a starting point and basic roadmap" which is much more palatable for everyone involved.

So what do I think of Regenerative Ag?

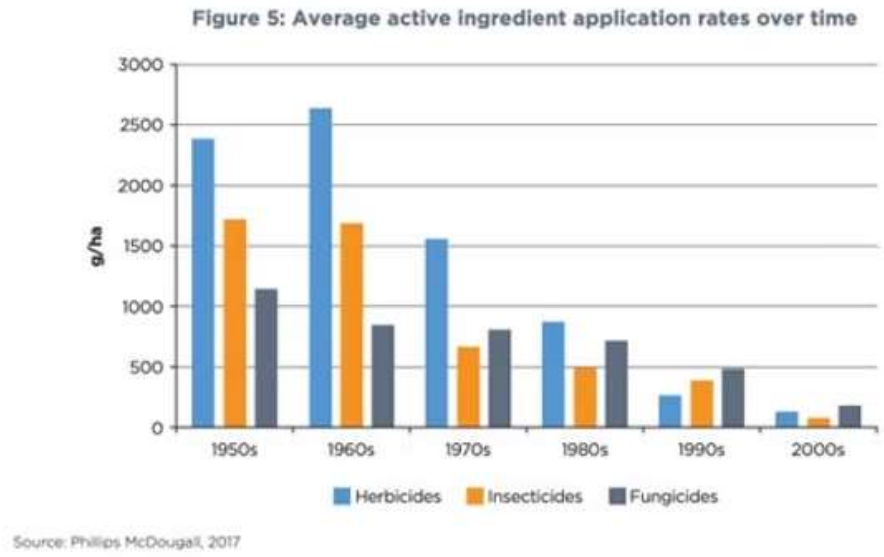
The components that make up regenerative agriculture can bring a lot of value to all farmers. The practices themselves each contribute tremendously to what the Soil Health Institute has deemed "healthy soil"; increasing soil organic carbon concentration, carbon mineralisation potential, and increasing aggregate stability. In fact, most "conventional" farmers already acknowledge this as we constantly see an emphasis towards better rotations, tillage management and diligence in using crop input products.

Another reason regenerative ag is "contentious" is because it is poorly understood from a first principles perspective. Regenerative ag needs talking about in practical, understandable terms, not marketing jargon. That is what will increase openness and adoption. It doesn't require a re-naming, it needs discussing in ways that resonate with farmers, not what resonates with ESG investors.

Overall, the adoption of these practices has implications for the entire industry too. As more of these practices are adopted we are likely to see growth in interesting areas of agriculture, including the biological space whether for increasing nutrient management, as an ancillary crop protection mechanism and even to aid in tillage management through "trash digesters". It also means we may need more work done on some challenging areas, like intercropping.

A word about crop protection products

While it is easy to emphasise the need to move away from synthetic crop protection products to fit into the "regenerative" bucket, I think frequently of this data from Phillips McDougall (now part of S&P Global) that is good context on the progress that has been made:



Average application rates in the 1950s were 1,200, 1,700, and 2,400 grams of active ingredient used per hectare for fungicides, insecticides, and herbicides respectively. By the 2000s the average use rates were reduced to 100, 40, and 75 g/ha. This technology evolution means the amount of active ingredient used by a farmer today is around 95% lower than the rate used in the 1950s.

The decline is palpable.

In the 1950's the average corn yield per acre was below 60bu/ac. Rounding to 60 that means 148bu/hectare equating to:

- 8 grams of fungicide per bushel of corn
- 11.5 grams of insecticides per bushel of corn
- 16 grams of herbicide per bushel of corn

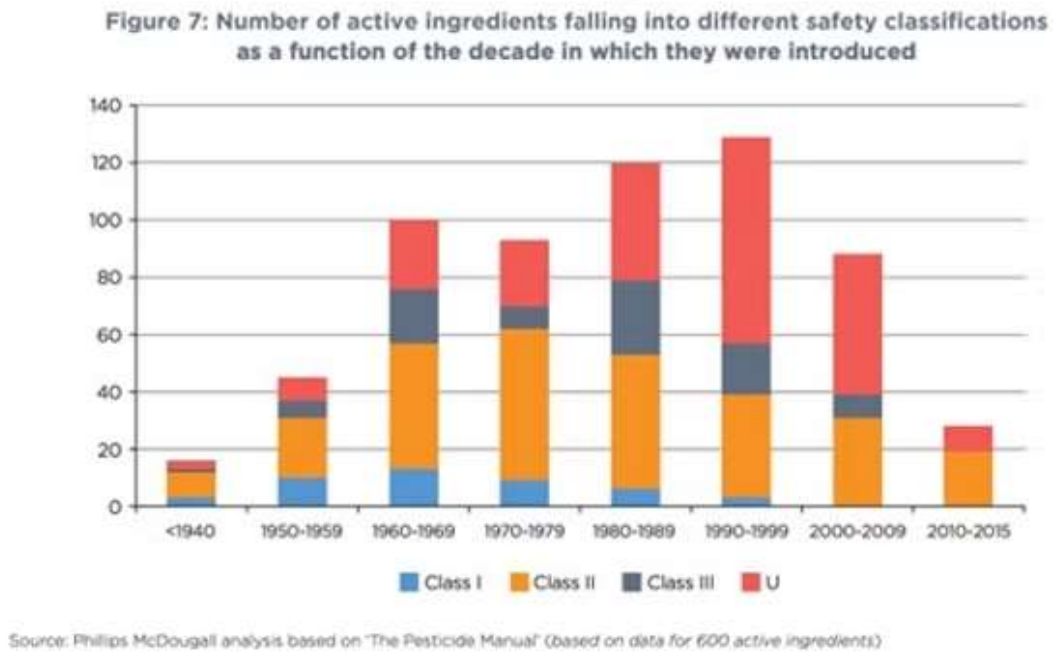
(Note: using corn as the default standard, obviously it will vary by crop)

Using the 2021 corn average of 175bu/ac equates to 432 bu/hectare meaning there was:

- 0.23 grams of fungicide used per bushel of corn
- 0.09 grams of insecticide used per bushel of corn
- 0.17 grams of herbicide used per bushel of corn

Yields have nearly tripled on average, while crop protection usage as grams per hectare have reduced by 95%!

Not to mention, the relative safety of the active ingredients used has improved as well:



It should be noted, the metric for safety in this case is LD50 in humans and not explicitly environmental impact, but there is a quote in the Phillips McDougall report emphasising environmental improvements as well:

"New and better pesticide active ingredients (more effective and less harmful to human health and the environment) have frequently been introduced while other

active ingredients have been banned or voluntarily cancelled by their manufacturers."

There will always be room to improve when it comes to environmental safety and crop protection products, but the improvements over the last ~60 years are impressive. This is likely to continue to increase with precision agriculture adoption and moves towards alternative ingredients to manage pests.

Shane Thomas is a Canadian agronomist, industry analyst, and creator of the Upstream Ag Insights newsletter.

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