



Knowing soils – Perspectives beyond growth in carbon farming

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Abstract

This article works with the idea that radical solutions in agri-food systems require multiple ways of knowing soils beyond the dominant scientific practices. Using a relational lens that invites us to think with soils, this article lifts our gaze to human-soil relationships in creating post-growth food systems. In the context of a grassroots initiative in Sweden that advances regenerative carbon farming as a transformational pathway to food systems within planetary boundaries, poetic inquiry is used to bring the often-unheard perspectives of "knowing soils" to the fore; how we know about soils matters.

Keywords

soils, temporalities, diverse economies, poetic inquiry

1. Introduction

Universal norms

Everyone is looking at carbon sequestration.

*The good thing about the thinking behind this is –
how do we make the earth better?*

*It will be a little liberating,
that you don't have to discuss this or that,
but what should you do then?*

*People are so damn unmotivated to try new things.
Many farmers are like that, probably because
they are so pushed to the margins.*

They can't.

It is a very big risk. And that is tragic.

*It doesn't match up – the idea of growth from the economic context,
it doesn't work!*

It is kilos that sell.

It is kilos that sell.

It is the norm.

It is problematic.

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Soil carbon sequestration (SCS) through regenerative carbon farming is an emerging context of agri-food systems transition. The voices in the opening poem above are those of Swedish "carbon farmers" freely reflecting on the current situation in agriculture as they see it. They point to hope – it's liberating to think about how we can make the earth better, rather than having to focus on other more trivial topics. But this hope prompts an open question – what should you do then? If it's kilos that sell, this transition is a huge risk for farmers who are already pushed to the margins. The farmers and landowners represented in this article, however, are working with a non-profit organization to pilot regenerative carbon farming practices on their land, trying together to work out viable models that pay farmers for building healthier soils to grow food. It is a project context where many (though not all, or not explicitly) refer to this kind of work as "regenerative agriculture" and see it as contributing to staying within planetary boundaries.

This project adopts a long-term, holistic perspective, and its participants inform the exploration undertaken in this article to inquire into the possibilities of this movement, contributing to transitions to post-growth food systems where socio-ecological needs are foregrounded. Post-growth systems are characterized in this article by three core elements, inspired by feminist, post-development, and feminist political ecology scholars. **First**, post-growth systems reveal and overcome dualist conceptualizations (e.g. humans/nature) that perpetuate hierarchies of knowing and erase diverse interconnectedness (Haraway, 1988; Plumwood, 1993). **Second**, the modes of knowledge production that are legitimate and valued extend to many ways of knowing (e.g. "thinking-with", which can open up for including more-than-human others (Staffa *et al.*, 2022) and thinking-feeling, which includes telling stories about how places evolve and how we sense those changes (Escobar, 2018; Gómez *et al.*, 2023). **Finally**, in valuing interconnectedness and diverse ways of knowing, post-growth systems center care that "encompasses diverse activities including the values that support our mental and political health for social development and the responsibility we have to care for human and more-than-human others so that we may stop thinking of the planet merely as a container of resources" (Gómez *et al.*, 2023, p. 156). A focus on care centers the relational, where care is "recognizing and learning from one's place in a diverse web of relationships and being drawn by the responsibilities that are embedded in such relationships" (Whyte & Cuomo, 2016, p. 240). In this way, post-growth food systems move beyond the prevailing society-nature dualism in capitalist society, embracing relationality, complexity, and a responsibility that means care is always a work in progress and never completed.

Currently, agriculture is framed as an important part of the solution to global concerns on feeding growing populations, mitigating climate change through negative emissions, and reversing the trend of overshooting planetary boundaries (e.g. EP *et al.*, 2021). Yet there is little incentive or means for farmers and landowners to respond. Proposed as a new business model, emerging carbon farming schemes offer financial rewards to farmers and landowners through a carbon market for sequestering carbon in soils (Lal *et al.*, 2021; Newton *et al.*, 2020), which the EU identifies as a strategy to shift agriculture to contributing to negative emissions and creating food security (EC, n.d.-a, 2021; IPCC, 2023). However, the global and European agri-food and carbon removal policy context is demonstrably propping up the status-quo (Newell & Taylor, 2018), depoliticized (Carton *et al.*, 2020; Karlsson *et al.*, 2018), and based on reductionist framings that hide injustices and diversity (Bumpus, 2011).

Taking inspiration from Gibson-Graham's (2008) performative project of diverse economies, this article aims to make visible the experiences of grassroots actors doing the work to contribute to social well-being and environmental regeneration in the agri-food context. The visibility of these activities is crucial for elaborating and enacting different economies that work with diverse temporalities beyond the linear and productionist temporalities of climate goals. The visibility of grassroots experiences must be raised in the deluge of market capitalist language (Newell & Taylor, 2018; Omar & Thorsøe, 2023) that gives the impression of futures determined by these dominant existing logics (Hulme, 2011) that struggle to work for long-term sustainability and justice (Gottschlich & Bellina, 2017; Stoddard *et al.*, 2021).

The story of carbon farming is also a story about soils. As such, this article employs "thinking with soils" (Salazar *et al.*, 2020) as a lens to not only make sense of existing human-soil relations in carbon farming contexts, but also as speculative engagement and critical attention to difference: how we know about soils, how

we care about soils, and how care shapes how we know about soils; where soils in their intrinsic heterogeneity are made think-able and soil-centered action is made possible in many ways.

To this end, I use poetic inquiry (Faulkner, 2019) to offer a re-reading of carbon farming that is open-ended and non-linear, and can take us to liminal spaces. Poems can account for the "culture, agency, and lived experience of those dependent upon within natural resource systems [sic]" (Fernández-Giménez *et al.*, 2019, p. 1081). I see these experiences and agencies extending beyond humans and following Puig de la Bellacasa (2015, 2017) engage with soil as a multispecies world, in which humans participate in "maintain[ing], repair[ing] and foster[ing] soil's liveliness" (2015, p. 703). Thus, in exploring human-soil relations through poetic inquiry, I am interested in connections between scientific and non-scientific ways of knowing soils through situated stories (Haraway, 1988), and examining how centralizing the practices of "human attention to soil relationality" can help forge diverse economies (Green, 2020) by disrupting the familiar representations of SCS in carbon farming (Gibson-Graham, 2008). It is not the intent of this article to engage in research in soil sciences, but to observe the perceptions of and relations to soils and discourses of soil science.² In this way, it focuses on farmers' experiences where discourses of soil science influence human-soil relations, including how farmers come to know their soils, where knowing encompasses more than just a scientific relationship to another subject. As such, by working with a theoretical lens and methodology that aims to engage with the core elements of post-growth systems outlined above, this article sheds light on what gets overlooked with the prioritization of urgent climate and agri-food discourses. With this, the aim is to demonstrate "a condition of possibility of new economic becomings, rather than a condition of their impossibility" (Gibson-Graham, 2008, p. 7). The objective of my analysis is therefore to investigate what conditions of possibility poetic inquiry helps us notice for post-growth food systems and how it helps us to think-with soils.

This article is structured as follows: I first give some background to the climate and agri-food policy context in which carbon farming is situated. This is followed by a conceptualization of "thinking with soils" as a theoretical lens to explore relationality. Poetic inquiry is then elaborated on as a research method, after which is an explanation of the farm visits and interviews that make up the empirical context for this article. Six poetic vignettes are then presented in the results section and provide the context for relational exploration. A discussion of the experiences brought forth in the poetic vignettes draws attention to the diversity of temporalities present in this regenerative carbon farming work. Thus, *time* is an organizing principle where pace/rhythm and past/present/futures feature strongly in the poetic vignettes, calling attention to the incompatibility of dominant market logics and regenerative soil practices. The article concludes with speculation on openings: what can this re-reading through poetic inquiry offer the imaginings and enactments of post-growth food systems?

2. Soils on the global agenda

Agri-food systems are a major contributor to intersecting ecological crises including climate change and biodiversity loss. At the same time, they are highly vulnerable to the effects of these crises (Clapp *et al.*, 2018). The incentive to transform these systems is high and has led to policy undertakings that link climate and agri-food systems with terms such as "climate smart agriculture" (Newell & Taylor, 2018). On the European Union level, this call for change is framed by a complex policy cocktail (see, for example, EC Directorate-General for Communication, 2021) where sustainable soil management for climate mitigation and adaptation, and as a core part of sustainable agri-food systems, is currently included in multiple European Green Deal strategies, such as the EU Soil Strategy for 2030, Sustainable Carbon Cycles, and the Farm to Fork Strategy. We hear the EU communicating "caring for soils is caring for life" (EC D.-G. R. I. *et al.*, 2020) as a soil deal for Europe takes shape to monitor soils and make sustainable soil management "the norm" (EC, n.d.c). Soils and their management are key components in a Green Deal that aims to overcome the "existential threat" of climate change and environmental degradation and "transform the EU into a modern, resource-efficient and competitive economy" (EC, 2021b). The Green Deal is currently the highest climate-protection program at the

² For perspectives on soil sciences, see e.g. Engel-Di Mauro (2014), Friedrichsen *et al.* (2021), Granjou & Phillips (2019), Janzen (2016), Lyons (2014), Richter (2020), and Wadoux & McBratney (2021).

EU level and is framed explicitly in terms of economic growth (Selwyn, 2021, p. 10). This is a key arena where the crucial role soils have in mitigating and adapting to climate change is taking shape (Bossio *et al.*, 2020; Bradford *et al.*, 2019; EC, n.d.,b; Lal, 2010; Lal *et al.*, 2021; Panagos *et al.*, 2022; Paustian *et al.*, 1997, 2019). Furthermore, framed as a carbon dioxide removal method by the Intergovernmental Panel on Climate Change (IPCC), where soils act as a valuable carbon sink, SCS is framed as a part of sustainable soil management, which can enhance biodiversity, ecosystem functions, employment, and local livelihoods (IPCC, 2023). Soils are made a priority in creating sustainable carbon cycles, where carbon farming plays a key role (EC, 2021a). In these ways, soils are becoming part of the global agenda (Hartemink, 2008) and are seen as the nexus between many life-sustaining spheres (Gu *et al.*, 2021; Lal *et al.*, 2017), connecting climate and ecological systems in green policies.

This policy context creates an arena in which soils are called upon in different ways – whether to sequester carbon or provide a healthy environment in which to produce food – and which creates conditions for member states to organize strategies to transition agri-food systems. Much critical work has already gone into unpacking the broader implications of these strategies. For example, in the EU's Farm to Fork Strategy (F2F), which is at the heart of the European Green Deal (EC, 2020), we see that the EU remains committed to a growth strategy that is antithetical to realizing food sovereignty and other interconnected sustainability goals wherein the F2F perpetuates entrenched inequalities in the food system (Alberdi *et al.*, 2020; Duncan *et al.*, 2020). F2F thus falls short of rebalancing power in the food system and strengthening farmers' positions in the food value chain, and instead foregrounds technocratic solutions and economic competitiveness (Omar & Thorsøe, 2023). Newell and Taylor (2018) examine the institutional and material power at work in shaping the global climate and agriculture policy context where business-as-usual agribusiness is made compatible with addressing the challenges of climate change. Here, policy also draws on language that is technocratic and market-oriented. Addressing negative emissions and carbon sinks, Carton and colleagues shine light on how the discourses on negative emissions and carbon sinks shape and legitimize a space where carbon removal is a "tool to reproduce the status-quo" (2020, p. 6).

Policy helps shape our material engagement with soils by shaping what we think soils should do/be, and the strategies of care needed to materialize this. The effect of this policy context is the delegitimization and appropriation of alternatives (Newell & Taylor, 2018) that have the possibility to advance different agri-food systems and knowledge that go beyond quantifiably measuring "success." The focus on soils is on their productive and carbon sequestering capacities, creating a set of temporal assumptions that foreground linear timings around climate goals, yearly accounting, and soil data that tells us about the past. These motives for caring for soils subsequently shape the kinds of knowledge seen as relevant for reaching climate and environmental goals, such as ascertaining the carbon content of soil. It shapes how soils are made think-able and the kinds of soil-centered action made possible. With policies that reinforce inequalities, deny food sovereignty, and foreground profit, the kinds of action made possible are pre-set to hinder the emergence of alternatives – particularly alternative human-soil relations. Green (2020, p. 285) argues: "For reclaiming terra—soil and earthly relations—requires struggles over forms of science that have been captured by economic, political, and legal practices that have situated in the web of soil life, the logics of private property, ownership, and control." This focus provokes the question of how we move from a relation of mastery and control toward "a science of partnerships in processes" (Green, 2020). How can we come to know soils beyond the dominant narrative of growth?

3. Knowing Soils – an invitation to new economies

An emerging scholarly movement to address the cultural, political, and ethical significance of soils in shaping climate and food futures invites a more critical engagement with the collaborations of humans and soils in agriculture (Granjou & Phillips, 2019; Granjou & Salazar, 2019; Holmstedt, 2022; Krzywoszynska, 2019, 2019; Krzywoszynska & Marchesi, 2020; Lyons, 2020; O'Brien, 2020; Puig de la Bellacasa, 2015, 2017). These perspectives conceptualize the relationality of soils, where things are mutually constituted through multispecies communities. This relational shift opens a space for alternative stories about living well in an era of climate change and relating differently to soils. "Thinking with soils" emerges from the work of Salazar and

colleagues (2020, p. 7) where they see this as "critically examining the current framings, discourses, and practices that make soils think-able for individuals and organizations, and making time and space for alternative ways of thinking soils and for soil-related action to emerge."

As was also evident in the policy context, interest in soil liveliness and soils as allies in tackling climate change and food security is moving out of the margins and stretching into soil science and agricultural development agendas and communities (Granjou & Phillips, 2019). Yet research that engages with farmers' experiences in this rising call to attend to soil health raises concerns that "as long as soil care is configured primarily as farmers' concern, the potential of attentiveness in generating ethical regard to the needs of soil biota will be limited" (Krzywoszynska, 2019, p. 661). Additionally, alternative ways of thinking about soils, as well as who has the mandate to think or know about soils, are limited by the dominance of discourses and practices that prioritize soils' productive / profit-generating capacities. One example – which is relevant for the practice of carbon farming in that it is based on a standardized way of viewing soils – is the orientation towards the productivity of soils. This perspective promoted the idea that soils are commensurable across geographies based on their chemical components, and which has historical roots in the chemical model of soil fertility (Marchesi, 2020). These soil conceptualizations supported the redistribution of expertise about soils from farms to labs (Marchesi, 2020). This transition normalized scientific tools, consultants, and advisors, shifting knowledge-building in farming to the realm of scientific expertise rather than in terms of farmers' own expertise normalizing the mantra "you can't manage what you can't measure" (Krzywoszynska, 2021). Puig de la Bellacasa (2015) further provides another historical account of how the linear orientations of economics and soil sciences converge in a productionist logic for innovative soil solutions that is gaining momentum in the anxiety accompanying overlapping ecological crises. This temporal alignment, she argues, shapes human-soil relationships around the extraction of economic value – a perspective also promoted by other scholars/researchers (Kearnes & Rickards, 2020; Kon Kam King & Granjou, 2020; Salazar *et al.*, 2020; Tironi *et al.*, 2020).

As Krzywoszynska and Marchesi (2020, p. 197) argue, if soils are primarily known through their carbon content, local land management strategies may be left unaccounted for, creating tensions between different systems of soil knowledge. Human and non-human actors thus become subjects regulated by, for example, carbon governance technologies that render landscapes legible and soils defined through their carbon content alone and omitting other valued socio-nature relations (Gupta *et al.*, 2012 in Jackson *et al.*, 2017, p. 870–871; Kearnes & Rickards, 2020; Leach *et al.*, 2012). How we come to know soils and their carbon content plays a critical role in the types of relationships formed (human-human-nonhuman) and whether these relationships re-establish existing hierarchies and inequalities, which is a key matter in post-growth futures. Thinking with soils is a relational approach that can help us in the creation of alternatives. It opens up the performative dominance (Gibson-Graham 2008) of scientific knowledge and economic growth and makes it possible to imagine how different ways of knowing can help us expand how we care for soils. This article contributes to this body of scholarship related to thinking with soils by exploring farmers' experiences and perceptions in the context of a carbon farming project that promotes and focuses on soil health and regenerative farming practices – what makes soils think-able for them and what kinds of alternative action are made possible?

4. Methodology – Project context, data production, and poetic inquiry

The empirical work for this article emerges from eight farm visits around Sweden, where farmers and landowners are voluntarily piloting carbon farming methods on their land. I chose to visit farms that have been operating as pilot farms in an initiative led by a Swedish project that aims to support carbon sequestration in Swedish agriculture, and has received funding from government agencies. The project is unique in Sweden, and small, hosting just a few dozen farms. As such, I do not provide detailed information about each visit as this jeopardizes the anonymity of my informants, which was the condition proposed to them and to which they consented. This project is a collaboration between two Swedish non-profit organizations that co-own the project and whose members have been participating in my research program's case study on carbon farming through focus group meetings and workshops from 2021-2022. The project was launched with the aim of supporting a transition in the agri-food context, where no top-down action was happening. The aims of the

non-profit project are: to forge connections between businesses (e.g. food producers) and organizations that can finance carbon storage and soil improvement measures on farms; develop and put into practice new knowledge together with researchers; and educate on carbon farming and soil health. The project's motive is to contribute to a long-term transition of agriculture that includes agroecological, regenerative and carbon storing farming methods to create a food system within planetary boundaries and to become a member-owned organization. In this way, the project exemplifies the ethos of a not-for-profit economy where the key purpose is social benefit and resources flow in a circular way rather than accumulating in the hands of the few (Hinton, 2020).

Consequently, to approach this agri-food transition holistically, the project members, whose perspectives inform my research, work to improve soil health, identifying a range of co-benefits that accompany that work (including, for example, improved water retention, improved human and animal welfare, resilience in food production, and economic profitability for farmers).³ The project creates a space for a grassroots movement where no other guiding policies from the Swedish government on complementary measures⁴ to reach the national goal of net-zero by 2045 yet exist.

Notwithstanding, as the green EU strategies demonstrate a pro-growth agenda, reports from relevant governing bodies in Sweden also reveal how firmly situated the climate-agriculture context is in economic growth logic. In a report on the role of agriculture in working towards national climate goals, the Swedish Board of Agriculture writes that the amount of food produced in Sweden needs to increase alongside increased resource efficiency, the phasing out of fossil fuels, and better care for soils to increase carbon sequestration (Markensten *et al.*, 2023). A publication on the agricultural sector's climate transition by the Swedish Environmental Protection Agency discusses the transition in relation to business and the economy, stating that key obstacles to decreasing the emissions from the agricultural sector are that the emissions do not have a price, that emissions from biological processes are difficult to measure, and that innovation in this sector is often not profitable for investors (Naturvårdsverket & Jordbruksverket, 2022). These agendas and noted obstacles arguably increase the challenges of any transition aiming for alternative economic framings.

The participating farms in the carbon farming project are spread out, mostly in the south of Sweden, and are of different sizes, with some farms piloting carbon farming methods on 86 hectares of land while others are focusing efforts on 3 hectares. They participate in this project as individual farms, although the project hosts networking opportunities in the form of online and in-person seminars and workshops on relevant topics. Farm visits are a key part of the project's work. The primary purpose of visits is to conduct soil health tests and talk with participants about their experiences during the project. For this case study work, six of the visits were conducted within the project organization, while I conducted two visits. The project members conducting the farm visits sent the farmers information about the aims of my research project and an ethics form prior to the visit. They obtained the farmers' consent for me to accompany them on the visit, assuring them anonymity in research outputs.

The farm visits consisted of semi-structured interviews, conversations, and walks into the fields piloting carbon farming. For example, we discussed what had happened since the farmers had shifted practice to try something new on their fields. These farmers worked with cover crops, agroforestry, rotational grazing, and effective microorganisms. My interest was to find out how these farmers experience caring for soils and what ways of knowing they used to understand soil health. During the visits I directed, I posed similar questions, including, for example, inquiring how participants knew that things were "going well" on a field (see Appendix A for the list of guiding questions). Each visit lasted 2-4 hours, was recorded with the consent of the participants, and then transcribed. Discussions started indoors and then continued while out on the pilot fields to undertake soil health tests, where I engaged as a participant observer. These tests were conducted with simple

³ How the not-for-profit ethos of the project interacts with the project's engagement in creating sustainable carbon markets in line with their explicit commitment to the framework of a circular economy, as articulated by Raworth (2018), is a pathway of inquiry that could reveal more about the political ecology of the project itself but is not pursued in this article.

⁴ Complementary measures are described as, for example, increased net absorption of greenhouse gases in forests and soil, separation, transport and storage of carbon dioxide of biogenic origin and verified emission reductions through investments in other countries (Markensten *et al.*, 2023).

tools including a spade, water bottle, measuring stick, hammer, plastic cylinder, timer, and sometimes a garlic press and Brix Meter (which is a simple instrument to gauge how stressed plants are based on nutrient levels at that moment).

My goal is to explore this context in a way that might affectively synthesize and communicate some of "the complexity and emotional-psychological dimensions of subjective lived experience" (Fernández-Giménez *et al.*, 2019, p. 1084) in a way that would be more open-ended and non-linear (Faulkner, 2017). To this end, I work with poetic inquiry by turning these conversations in fields and kitchens into poetic vignettes (Faulkner, 2019), where poetic inquiry is thus both a method and result of research activity. I use poetic inquiry to resist the norms (van Amsterdam & van Eck, 2019) of dominant science communication I see in agri-food contexts, and to use a form of analysis that could access the senses in a way that could lead one to "pause, reflect, feel" (Glesne, 1997, p. 213). Poetry brings liminality; a language of creation that goes beyond the strict borders of scientific inquiry which "is connected to the rhythmic, chaotic and affective dimensions of participant's lives (and our own)" (van Amsterdam & van Eck, 2019, p. 305).

I transformed interview-conversation transcripts into poetic vignettes where each vignette consists only of the research participant's own words (albeit translated) engaging in *poetic transcription* (Glesne, 1997). Using the guidance of Glesne's poetic transcription example, the words in the poetic vignettes are taken from the whole transcription and kept in order, except for a couple of sentence order changes for clarity. The poetic transcription process started with reading and re-reading interview transcriptions and pulling out major themes from each transcript. I then coded and sorted the transcriptions by those themes. "How we know about soils" and the "challenges of being a carbon farmer" were both prominent themes given that my interview questions as well as the questions of the project organization during farm visits were specifically around these topics. Other topics such as "advice to politicians" and "dreams for the future" contained less data, both because they emerged more organically in conversation and because of a lack of time to develop the conversations further on the topic.

To create the poems, I used parts from each theme that resonated with me or that captured an essence of what each participant was saying as I understood it; "I was not only trying to make sense of data but also attempting to use [the participants'] words to convey the emotions that the interviews evoked in me" (Glesne, 1997, p. 206). Following Meier and Wegener (2017, p. 194 in Helin, 2020), I understand resonance as the "ability to evoke images, memories and emotions." The vignettes do not mix voices; each is from just one person. Since the conversations were held in Swedish, I have translated them into English, losing some of the original power of the language and rhythms. I have tried to maintain the meanings as I felt them, underscoring that this approach "creates a third voice that is neither the interviewee's nor the researcher's but it is a combination of both" and "imposes particular meaning" (Glesne, 1997, p.215). Poetic inquiry is thus a method of re-presenting versions of these farmers' experiences, filtered through myself, the researcher. It is a method that makes explicit that:

When we write social science, we use our authority and privileges to talk about the people we study. No matter how we stage the text, we – the authors – are doing the staging. As we speak about the people we study, we also speak for them. (Richardson, 1992, p. 131 in Glesne, 1997, p. 214)

In using poetic vignettes, my aim is to make the staging more transparent because, even though all the words from the vignettes are the participants' own words, I have re-presented them. Thus, the vignettes created through this experimental form of writing tell small parts of the different participants' stories in this carbon farming context, saying something about how human-soil relations are shaped.

These vignettes aim to show, rather than tell (Faulkner, 2019, p.11), something of participants' lived experiences. Using poetic inquiry, I aim to explore ways of worlding creatively – including thinking about what keeps dominating ontologies in place and how we can begin to undo and rework the centrality of particular dualisms (e.g. nature/culture) that have been culturally harnessed with such catastrophic consequences

(Escobar, 2018, p. 65). Through this third voice, poetry helps us notice the relational rather than the instrumental, drawing attention to the diverse knowledge and wisdom that emerges in this context and resisting the discursive erasure of global climate policies.

5. Poetic vignettes on regenerative carbon farming

These vignettes are an attempt to tell situated stories in chorus. I now invite the reader on a journey through these farmers' stories.

The long-term

This whole thing about building flexibility and resilience in all systems...

we've still burned ourselves out pretty badly once or twice already.

But we have to have a broader perspective on what we are doing for it to be sustainable in the long-term.

It is such an incredibly long-term perspective.

That is what is so tricky –

how can you get a harvest that is acceptable for the investments in work and time?

There is no perfect solution

because we are fighting a system

structured in a completely different way.

It is kilos that sell.

It is kilos that sell.

It is the norm.

It is problematic.

So where do you start then?

How can you compete with the conventional?

Store carbon; think about your body!

Responsibility

Everyone must take responsibility for the climate.

And we have the advantage that we can do this.

We can sequester carbon while waiting for better technology.

But when you think of an ordinary farmer, if this is going to spread, there must be money in doing so.

Otherwise, you won't survive.

It means bankruptcy.

We must sequester carbon.

In the long run, then, yield loss.

And something has to make up for that.

That's how it is.

We think long-term better soil health, but, at the same time, our ancestors have fought:

they have moved stones, they have dug by hand, removed weeds.

And we do not till

then it will be full of weeds,
which we have fought for so many years to get rid of
to grow as much grain as possible.
There are two important things:
we have to have food,
we have to sequester carbon.
We have to find levels where we can do both.
We have now invested a little too much in
carbon sequestration.

How do we know?

I think everybody is different.
I feel a bit of stress,
underlying stress, that is pushing also.
You know this stress
about knowing that things cannot continue as they do.
Having enough knowledge to know
that you cannot continue to take nourishment out of the soil
because you are depleting it.
Knowing if you take a shovel and you go down into the soil
open and see that there's no humus left,
that you can see with your eyes,
that's a fact, you can't go against it...
Nature speaks for itself if you look at it.
Many people need to have the evidence written;
I am not one of them.

Nature responds

Conventional agriculture says
that we run much more economically because we can fertilize –
the computer says to fertilize here
and fertilize there.
While we say
why fertilize at all
when we can make it work anyway?
– This has to do with how did we know we were doing the right thing.
What do we in agriculture need to do?
The organic certifier's rules were an A5 page when we started.
Now it's a book.
Just because.
But at that time, people thought: *nature first!*
And then came the rules.
But who says that will be good?
What about free thought and will and vision?
After all, that is what moves us forward.
Farms are bought up, shut down, and children no longer take over their parents' farms.

Some build up bigger and bigger units.
That's how you do it because you have to make a profit.
But of course, nature does respond.

Partridges

Easy.
I want partridges.
If partridges come,
then the ecosystem works.
Then there are insects.
Then there is protection for them.
And that is ONE indicator.
It's not the only one.
It's easy to register.
But there is not a statistic for them.

"Are we on the right track?"

Getting the biology going,
fungal life...it's sometimes close to zero.
It's absolutely crazy.
You begin to understand
that quite a lot has happened for a long time
in the wrong direction.
How do we make the soil better?
Getting the cows out, trampling, grazing, and fertilizing
– simply –
is seriously underestimated.
That's a farmer – we test, then we try, we try some more.
But to quantify,
precisely box in
exactly how it should be done,
exactly how it should be communicated,
how it should be received,
it becomes damn difficult all of a sudden.
How do we take this further?
I don't necessarily see the point of greenwashing
but the effect here in the soil of what one does –
yes,
we would like to be able to quantify, measure, for our part.
If there is someone who wants to pay for it because it will improve the system,
then that is great.
But I'm not that interested in selling
someone else's right
to do something over there instead.
We get better soil health and so on
we make money from it.

What you want when you're out in the field are quick methods,
it doesn't have to be exact numbers
between the thumb and forefinger – getting better, getting worse...
Measure.
Simple,
quick methods to be able to quantify
"are we on the right track?"
I can go out and smell, feel, taste – those are the methods we use
and dig,
simply,
feel.
But a small app, or instrument...
There are so many variables.
The problem is when I go out and dig and feel here and there
there are a lot of opinions – the perception that
"now it feels a little better"
because you are in a better mood or...
but to go from feeling, tasting, smelling
to sticking a probe into the soil.
It would be hot stuff if you could find exact parameters –
call it soil health,
– is the soil doing better?
And what, then, is better?
You can do everything from counting worms to infiltration
to lots of ways to do it,
but ideally you could do it in the same way
in Skåne as in Jämtland as Australia
or whatever you want.
Universally.

6. Discussion

The poetic vignettes presented here illustrate grassroots experiences in carbon farming. Read against the backdrop of global and EU climate and agri-food policy discourse, as well as the personal choice of these actors to be part of piloting carbon farming in Sweden, I ask: in weaving through these poetic vignettes, what conditions of possibility do they help us notice for post-growth food systems and how do they help us to think with soils?

To start, the vignettes together give nuance to different ways that soil health is visible or becomes knowable to these farmers and landowners – tasting, feeling, digging, seeing the humus, smelling, water infiltration, structure, insects, worms, birds. "*Store carbon; think about your body!*" ("*lagra kol, tänk på din bål!*") was one farmer's way of expressing the connection of bodily health to the health of the soil; even the experiences of burn-out connects the body to the work of healing soils in this farmer's story. Throughout the vignettes, there is a sensorial and embodied involvement in understanding soil health, and these practices were familiar to most of the participants. Farmers, together with the non-profit organization, make time to walk out into the fields with a garlic press (to squeeze liquid from plant leaves), hammer, and old bits of cylinder to

assess soil health. Tasting, feeling, smelling, digging. I see these practices as "commoning practices" as they are not about efficiency or a perspective on management "where the future is organized towards a specific, technically defined goal of biological sustainability" (Bresnihan, 2015 in Puig de la Bellacasa, 2015). Farmers *make time* to engage in this way, which has a pace of its own.

In other ways too, the vignettes call attention to a variety of timescales and temporalities in these contexts that bring forth the richness of relationality in these farms. Fungi, cows grazing and trampling fields, a time when folks thought "nature first", partridges returning, ancestors working by hand, building long-term resilience – these are rhythms that the farmers are part of, sense, and help create – and which illustrate a thickness to the present (Haraway, 2016). This thickness refers to the knot of multiple simultaneously living lives – such as reinvigorating fungi, grazing cows, and the taste of soil at that moment – that contrasts the flattened and linear time frames of climate urgency and productionist achievements (Puig de la Bellacasa, 2015). Indeed, most of the vignettes express an indication that we have been doing the wrong thing for a long time – "*depleting the soil*", growing "*as much grain as possible*", "*fungus life*" being "*close to zero*", fertilizing for profit. The first three vignettes further convey the experience of an ethical burden related to these wrongs – a fight, a responsibility, a *knowing*. Their involvement in and attention to these timescales that go beyond their own human lives comes forth as stressful and risky in "*How do we know?*" and "*The long-term.*"

While the sensorial practices in a thick present are well-established – "*that's the farmer*" – they are made inadequate and irrelevant because "*It's kilos that sell*", "*there's not a statistic for [partridges]*" and "*you have to make a profit.*" Particularly in "*Are we on the right track?*" a desire for quantifiable methods that make what they do comparable and universal is explicit. The farmer in "*Responsibility*" also states their belief that technology will be developed to help with the task of carbon sequestration, but until then, we wait and do what we can. Thus, the questions posed of "*is the soil doing better? And what, then, is better?*", "*Who says it will be good?*", and what is "*acceptable*" illustrate a spectrum of insecurities that these actors operate within. Soil is still connected to the value that might be extracted from it by sequestering carbon and producing yield, which sits in contradiction to the "*long-term*" temporalities of soil and ecosystem health that farmers are also thinking along. Two farmers hint at mistrust in their own capacities to tell if they are going in the "*right direction*" and lament the loss of "*free thought and will and vision*" – poor conditions for creative experimentation in building alternative farms and developing and building trust in their soil sense-abilities (Krzywoszynska, 2019, p. 664).

The demands of remaining profitable, producing yields, showing statistics, make visible the tension between the long-term repair of soils and the demands of food production in a "clash of temporalities" (Puig de la Bellacasa, 2015, p. 699). The "*easy*" metrics of partridges and what "*you can see with your eyes*" are "local systems of soil knowledge and valuation" (Krzywoszynska & Marchesi, 2020, p. 197) that do not directly contribute to the accounting logics of SCS. The rhythms that shape the relationships in this thick present and how farmers know about their soils are thus "excluded from knowledge and made invisible" (Kallio & LaFleur, 2023, p. 10; Puig de la Bellacasa, 2014). In their ethnographic work with regenerative farmers, Kallio and LaFleur (2023, p. 10) reflect that turning farmers' practices into data effectively erases the relationships that gave rise to them, as well as making invisible other practices that are consequently counted as data. This is a trend that is emerging in the push to carbon farming.

"*Are we on the right track?*" illustrates this trend and takes us more deeply into a story of data where the practicality and intuition of a farmer – "*we test, then we try, we try some more*" – also longs for exact parameters for information on soil health. The incentive to "*make money*" works jointly with a logic of attentive experimentation for making the soil better. This vignette shows that engaging in regenerative carbon farming makes it important to "know how carbon [is] becoming sensible in their soils" (Kallio & LaFleur, 2023, p.10), and is apparently influencing how farmers relate to and know their soils. This farmer sees the need to translate the many variables of this work into quantifiable language – making it communicable. Reading this together with "*Nature responds*", which speaks to the influence of the organics sector, we can imagine how even the as-of-yet-non-existent rule book of carbon farming may leave little room for "*free thought and will and vision.*" Soils respond with a huge diversity of communicative expressions, as these vignettes show. Responding in kind may mean that sciences have a different kind of supporting role (Krzywoszynska *et al.*, 2020, p. 102); that

rather than being in the service of a global carbon or agri-food economy, "*free thought*" and experimentation participate in a "science of partnerships in processes" (Green, 2020).

7. Openings

This article has been motivated by the hope of making visible experiences and relationships in the context of a grassroots agri-food movement where the aim is to contribute to social well-being and environmental regeneration. In this sense, my interest is in openings, rather than conclusions. By making different relationships visible and imaginable, the thick present that emerges through these poetic vignettes via multiple overlapping temporalities invites pause – what gets overlooked with the prioritization of urgent climate and agri-food discourses? Poetic inquiry shows conditions of possibility for new economic becomings by bringing what is usually in the background – multiple co-existing temporalities, relationalities, and emotional engagement – to the foreground (Gibson-Graham, 2008). It is a way to rework how we talk about agri-food transitions that resists the discursive erasure of global climate politics.

Together with Holmstedt (2022) and Green (2020), I suggest that the matter of soils and SCS told through poetic inquiry supports a creative reworking of ways of knowing, being, and doing that "attends to the vital continuum of relations between humans and humus" (Green, 2020, p. 286). These processes of reworking "urge[s] us to stay with these troubles, with these fierce and ordinary realities" (Holmstedt, 2022, p.62) in ways that reclaim attention to human-soil relationality and that do not attempt to universalize around dominant economic growth principles. In this way, poetic inquiry also helps us to think with soils. Re-reading carbon farming through this relational lens surfaces the political struggle of what "normal" ways of knowing are in agri-food systems and how diversifying these ways of knowing is crucial for the emergence of post-growth food systems that value care and diverse modes of knowledge. Finally, by presenting these stories as poetic vignettes, I hope to evoke for readers why the experiences of these participants matter politically (Burford, 2018) in imagining and enacting alternative agri-food systems.

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Appendix A

Guiding Interview Questions

1. What did the farm/land/soil look like when you first started farming here? What needs did you identify? What did you do / how are you able to respond? How has the soil changed?
2. Do you have any guiding principles, practices or approaches to your work? What is important for you?
3. How do you know that it is going well? Does the soil teach you about that?
4. What do you think your farm will look like in the future?