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Repopulating European soils.
Adapting our understanding of soil to safeguard our food security

(#Agriculture #Biodiversity #CAP #Europe #Meshwork #Soil)

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Last winter, farmers across the European continent took to the streets to express their profound discontentment over existing agricultural policies. Because political responses were taken hastily without addressing the issue at the root of farmers' anger - the undervaluation of their work - tractors and angrily-breathing bodies are occupying the streets again in November 2024.

Since the advent of industrial agriculture, policies and economies exploitative of farmers and land (37 percent of European farms have closed between 2005 and 2020) have disciplined farmers to develop practices dependent on external resources sold by a handful of giant corporations (Eurostat 2020). This has not only emptied farmers' sovereignty - rendering their work impossible without expensive inputs - but has also alienated them from the beings who make their lands cultivable and their foods nutritious. This case study engages with this alienation.

It unfolds in three steps. After analysing the origin of European farmers' anger and the measures taken in response (I), it argues that lawmakers' difficulty to change the vision for agriculture substantially is the consequence of the persistence of a mechanistic worldview - one that conceives of our living environment as an impediment rather than an ally in growing food in a changing climate (II). It then adopts an approach enriched by the social scientific field of multispecies studies which - through its objective to pay "attention to the diverse ways of life that constitute worlds" (Van Dooren, Kirksey, & Münster 2016, 1) - allows to reveal it is a soil home to a diversity of beings which truly keeps our environments habitable (III). Throughout the study, I advance four *'enlivening'* concepts, developed by *attentional* thinkers, which will assist me in drawing an alternative understanding of soil as fundamentally alive (Weber 2020, 1-17).

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Agricultural mobilisations for … political immobilisation

Although farmers' reasons for protest varied, four sources of discontent resurfaced across - internally diverse - national movements: the low prices farmers obtain for their produce, the food markets' liberalisation forcing farmers to compete with cheap imported products, environmental requirements inciting farmers to shift their practices, and the disparity of norms to be complied with (Gozzi 2024; Henley 2024). Especially this last element has exasperated farmers recently.

Internally incoherent, the existing EU regulatory framework points European farmers in opposing directions. This is the result of the fact that the main subsidies allocation mechanism at the basis of the Common Agricultural Policy (CAP) - which allocates subsidies in function of cultivated surface - was left unadapted when new ecological requirements were integrated in the CAP with the adoption of the European Green Deal (EGD) in 2019. As a result, the current framework traces out a path of a mechanised agriculture and path of a less environmentally harmful one side by side. These two incompatible trajectories leave European farmers puzzled, making it unclear how to develop their practices.

Regrettably, the measures taken in response to the mobilisations, both at EU and national levels, have often gone in the same direction: that of holding on to the industrial model and scrapping plans fostering the transition to more regenerative models. Even if this might appease the anger of some industrial could-be-farmers in the short term, through these decisions farmers' sovereignty was further hollowed and their dependency on climate-disruptive and ecosystem-destructive synthetic fertilisers, pesticides, and monogenetic seeds was perpetuated.

Yet, as a recent assessment of the CAP by a group of biologists concludes, measures that water down EU environmental objectives actually "threaten the natural resources and biodiversity on which the foundation of food systems stands" (Cuadros-Casanova et al. 2022, 12). This resonates with the findings of an earlier report of the European Court of Auditors in which it warns that the CAP is still insufficiently adapted to curb the biodiversity loss and environmental destruction threatening European food security (Court of Auditors 2020).

One of the main architectural issues of the current CAP is that, by incentivising farmers to increase their cultivated field size, it fosters landscape homogenisation. Yet "Landscape homogenization acts as a facilitator of invasive species due to simplified ecological communities (...) and leads to the loss of beneficial species, such as wild pollinators and natural pest control organisms, which has significant negative effects on crop productivity" (Cuadros-Casanova et al. 2022, 5)

The result is a ***simplification*** of the ecosystems rooted in our lands. As anthropologist Anna Tsing observes of such simplifying structures (as the CAP), "they discipline organisms [eg. potatoes, cereals, carrots] as resources by removing them from their life worlds", and deprive "organisms of their ordinary ecological partners, since the latter are imagined as hindrances to asset production" (2017, 59). Consequently, the "living-space entanglements" of crops to other beings that ensure its resilience - birds or insects feeding on the crop's predators, or fungal and bacterial partners facilitating its healthy growth - are reduced, rendering them vulnerable to events of even minor adversity (a single pest's passage or a prolonged period of rainfall) (Tsing 2015, 5).

Another way of understanding this fragilisation of our environments is as a reduction of the lifelines of diverse beings which intermingle to shape the ***meshworks*** that are our cultures. Homogenising our landscapes, we forget that they are what anthropologist Tim Ingold describes as meshworks or "zones of entanglement" (2008, 1807) in which "organisms grow to take on the forms they do, incorporating into themselves the lifelines of other organisms" (2013, 11).

Visible and invisible-ised pathways

The idea that there is no alternative to the conventional system of industrialised food production appears as a recurring reaction to the farmers' complaints. As soon as the question of possible other food systems is raised, the mind is colonised by this deeply internalised conviction. The fact that it has been thirty years that food production equalled food demand (SOS Faim 2017), that the food produced globally suffices to feed 12 billion people (UN Conference on Trade and Development 2013), or that one third of world food production is wasted or lost annually under the conventional industrial agricultural systems (FAO 2021, FAO 2022, UNEP 2021) does not seem to destabilise this internalised conviction.

The "no alternative" formula reflects the persistence of a certain way of understanding agriculture. Indeed, rather than a higher suitability of mechanised agriculture to answer current ecological, social and food security needs, what it reveals is an epistemic domination of the economic-scientific knowledge system which underlies it. This epistemic domination can be understood as a 'monoculture of the mind', a notion proposed by physicist Vandana Shiva (1993). It refers to the phenomenon by which - through increasing involvement of corporate interests in food production - one unique way of understanding the realities in which agriculture takes place became the sole valid source of knowledge about food production.

The danger of such monocultures resides in their ignorance of "the evolutionary potential and intelligence of cells, organisms, ecosystems and communities". As Shiva describes it, they are blind "to

the ecological functions arising from the relationships and co-operation between diverse living components of an agro-ecosystem" (2016, 44), i.e. to *meshwork* entanglements.

It is a direct result of these monocultures that the parameters used to compare agricultural models, presented as objective, are often reductive - and *simplifying*. Take the conventional definition of *productivity* (and its sister parameter *yield per acre*) for instance. On the one hand, it reduces input to physical labour, leaving out external resources (pesticides, fertilisers, and fossil fuels driving machinery). On the other hand, it reduces output to one component of one crop, e.g. the grain of the rice plant, without neither considering other crops that could have grown simultaneously nor the value of other components of the same crop (leaves, stems, roots) in the agricultural ecosystems (for nutrient recycling as animal feed or organic manure). Simultaneously, it also leaves out of view ecological externalities (biodiversity loss, soil salinisation). Such parameters - ostensibly objective - tacitly remove from view other possibly more relevant criteria for comparison, such as *nutrition per acre*.

Collaborating with worldmaking beings to build resilience

Although industrial agriculture has normalised the killing of the beings composing our soils, it is still *in soil* that farmers must plant crops to grow them. It is a soil rich in biodiversity - full of different ***worldmaking*** organisms (Tsing 2015, 21-22) - which is the basis for growing healthy food. Its fertility is the work of countless soil organisms: nematoda, protozoa, fungi, bacteria. Their tracks and traces, digestion and dispersion, make the cycle of organic matter possible and allow the circulation of nutrients.

From the perspective of crop cultivation, three of the soil's protagonists are the earthworm, the mycorrhiza, and the rhizobium. Each engages in worldmaking efforts and through these benefits other soil inhabitants, including humans. About the first, Charles Darwin wrote "it may be doubted whether there are many other animals which have played so important a part in the history of creatures" (Shiva 2016, 33). Indeed, throughout their life, earthworms transform their - and in the process, also others' - environment in impressive ways. Not only does their manure enrich the soil with nutrients, through their foraging walks they also increase soils' water retention capacity by 30 percent and augment its oxygen porosity - a prerequisite for any being's breathing - significantly.

Mycorrhizae, then, are partnerships resulting from the loving encounter of a fungus and a plant (Tsing 2012) in which both partners exchange gifts. In return for some of the plant's sugar, the fungus - penetrating the plant's roots - offers it water & nutrients and extends its roots' surface area. These collaborations form humus for other soil inhabitants and bind the soil, creating aggregates. Most of our foods rely on these partnerships.

Finally, rhizobia are a symbiotic partnership between a bacterium and a plant belonging to the pulses or the legumes. In exchange for the gift of carbon, the bacterium captures nitrogen from the atmosphere and transforms it for the plant.

Soils rich in biodiversity form invaluable allies in both climate mitigation and adaptation. Living soils function like sponges: they retain significantly more water than biodiverse poor soils - humus being able to take up to 90 percent of its weight in water (Shiva 2016, 32) - and distribute water more evenly across space and time. This has two implications. First, living soils require little water to grow crops, making life-sustaining agricultural systems more resource-independent than industrial ones. Second, when facing extreme weather conditions, living soils are more resilient - humus holding water for a longer time, and aggregates providing robustness against erosion (Leu & Shiva 2022)

Synthetic products destroy these humble societies. Due to their indiscriminate effect, pesticides kill many soil inhabitants, including our soil-transforming protagonists. Oil-derived fertilisers - composed of NO, a 300 times more potent greenhouse gas than CO2 - block the capillaries which transport nutrients and water through the soil, stop rain infiltration, increase run-off, and kill soil life via their salinising effect, increasing irrigation need (Shiva et al. 2017).

Truly sustainable agriculture requires us to track the lifeways of the beings that make our cultures possible. It demands to implement insights of what philosopher Baptiste Morizot calls an ***agro-ethology***, a body of knowledge about the ways of life of the organisms we necessarily must correspond with if we seek to grow healthy food. Since we cultivate our food in soils and within fields made fertile and cultivable by earthworms, fungi, and bees - but also in the homespaces of competitors like ants or rats - it is vital to know these beings' 'uses of the world, their demands, their most precise habits', i.e. their *ethos* (2020, 133).

Conclusion

It is a matter of human survival to repopulate our soils - epistemologically and physically. If we want our cultures to be *robust* against the era of fluctuations announced by climate change, we must root our agriculture in breathing soils (Hamant 2024). It is only by collaborating with soil organisms that we will safeguard our food security, for, as Science and Technology scholar Maria Puig de la Bellacasa holds, "there is no such thing as a human future: from where we stand, futures can only be more than human" (2020).

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