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# 'What can a little leaf do?': mulch, farming autonomy, and the generosity of infrastructures in ruined agricultural landscapes

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## ABSTRACT

In recent years, conceptualizations of infrastructure have proliferated alongside a growing concern for the role they play in sustaining and shaping socio-political life. In this article, I engage with mulch as an infrastructure to bring forth agroecological imaginaries and practices of soil care and to examine their potential to foster more just and sustainable agricultural futures. Working with the concept of 'generous infrastructure' and my own sustained engagement with mulch as an agroecological farmer, I explore how mulch is mobilized to take care of soils and how it can promote more autonomous ways of farming in ruined agricultural landscapes. As a generous infrastructure, mulch can be easily improvised with accessible materials and its (de)composition can contribute to growing autonomy by enabling generous exchanges and encounters between farmers and soils. I argue that reframing mulch from a passive material to a generous infrastructure challenges notions of autonomy as an exclusively human achievement and foregrounds the relations of care between farmers and soils that are key to it. However, I also highlight the importance of not romanticizing generous infrastructures by drawing attention to material, temporal and cultural complexities, as well as tensions and challenges across farming communities and contexts.

## « Qu'est-ce qu'une petite feuille peut faire ? » : paillis, autonomie de culture et la générosité des infrastructures au sein des paysages agricoles en ruine

### RÉSUMÉ

Durant ces dernières années, des conceptualisations de l'infrastructure ont proliféré en parallèle avec une préoccupation croissante du rôle qu'elles jouent dans l'entretien et le façonnement de la vie socio-politique. Dans cet article, je me sers du paillis comme infrastructure pour mettre en avant des imaginaires agroécologiques et des pratiques du soin des sols et pour examiner leur potentiel de

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promouvoir un avenir agricole plus juste et durable. En travaillant avec le concept de Papadopoulos' (2018) des « infrastructures généreuses » et mon propre engagement durable avec le paillis en tant qu'agriculteur, j'explore à quel point le paillis est mobilisé pour prendre soin des sols et comment il peut favoriser des façons plus autonomes de cultiver au sein des paysages agricoles en ruine. Servant d'infrastructure généreuse, on peut improviser la production du paillis avec du matériel accessible et sa (dé)composition peut contribuer à améliorer l'autonomie en facilitant des rencontres et échanges généreux entre les fermiers et le sol. J'affirme que repenser le paillis comme une infrastructure généreuse au lieu d'un matériel passif remet en question des notions de l'autonomie comme une réussite exclusivement humaine et met en avant les principales relations de soins entre les fermiers et les sols. Cependant, je souligne également qu'il est important de ne pas romancer les infrastructures généreuses en attirant trop d'attention sur les complexités matérielles, temporelles et culturelles, ainsi que sur les tensions et difficultés à travers les communautés et contextes agricoles.

## **¿Qué puede hacer una hojita?: el mantillo, la autonomía agrícola y la generosidad de las infraestructuras en paisajes agrícolas degradados.**

### **RESUMEN**

En los últimos años, las conceptualizaciones de infraestructura se han multiplicado junto con una creciente preocupación por el papel que desempeñan en el sostenimiento y la configuración de la vida sociopolítica. En este artículo, analizo el mantillo como infraestructura para explorar imaginarios agroecológicos y prácticas de cuidado de la tierra, y examinar su potencial para fomentar futuros agrícolas más justos y sostenibles. Partiendo del concepto de 'infraestructura generosa' de Papadopoulos (2018) y de mi propia experiencia con el mantillo como agricultor agroecológico, exploro cómo se moviliza el mantillo para el cuidado de los suelos y cómo puede promover prácticas agrícolas más autónomas en paisajes agrícolas degradados. Como infraestructura generosa, el mantillo se puede improvisar fácilmente con materiales accesibles y su (des)composición puede contribuir a una mayor autonomía al posibilitar intercambios y encuentros generosos entre agricultores y suelos. Sostengo que replantear el mantillo, pasando de considerarlo un material pasivo a una infraestructura generosa, desafía la noción de autonomía como un logro exclusivamente humano y pone de relieve las relaciones de cuidado entre agricultores y suelos, fundamentales para ella. Sin embargo, también destaco la importancia de no idealizar las infraestructuras generosas, al llamar la atención sobre las complejidades materiales, temporales y culturales, así como sobre las tensiones y los desafíos que se presentan en las distintas comunidades y contextos agrícolas.

## **Introduction**

*'What can a little leaf do?'*. These words have stuck with me for the past few years. My neighbour stated them sceptically as he watched me collecting, processing, and piling

up bunches of leaves and woodchips around the bottom of fruit trees. I answered tentatively, noting the benefits of adding organic matter to the soil, improving water retention, providing temperature insulation, suppressing weeds, and enhancing my autonomy as a smallholder farmer. But as I was listing all these potential benefits, I realized they all seemed very ambitious goals for 'a little leaf'. After all, a leaf on its own does not do any of those things, but as part of an infrastructure, it *might*. This infrastructure is mulch.

Mulch is more commonly known as a material covering – usually organic but not exclusively – used in gardening and agriculture to protect plants, conserve moisture, control weeds and improve soil fertility (Chalker-Scott, 2007). However, in this article, I engage with mulch as an infrastructure to bring forth agroecological imaginaries and practices of soil care and to examine their potential to foster more just and sustainable agricultural futures. For soil scholars, the widespread degradation of agricultural soils makes the study of non-mainstream, grassroots practices and knowledge of soils an important point for critical intervention to unearth more socio-ecologically sustainable human-soil relations (Krzywoszynska & Marchesi, 2020; Sharp et al., 2025). Working with Papadopoulos (2018, p. 203) concept of 'generous infrastructure' and my own experimental and sustained engagement with mulch as an agroecological farmer, I explore how mulch is mobilized to take care of soils, and I examine how it can contribute to growing farmers' autonomy in ruined agricultural landscapes.

In agroecology, healthy and living soils are crucial for sustaining farmers' autonomy (Gliessman, 2007; Shiva, 2008). As soil degrades, farming becomes increasingly reliant upon mechanical and chemical inputs: tractors and tillers are needed to break the hard pan, allowing better aeration and water infiltration; synthetic fertilizers are necessary to feed crops; pesticides become vital for the prevention of fungal and bacterial diseases; and water requirements intensify (Giller et al., 1997). These conditions lock farmers into relationships of dependence with agrochemical companies and their products, outside expert knowledge, state and non-state infrastructures for water and other inputs (e.g. fossil fuels), making them more vulnerable to climate change and infrastructural failures (van der Ploeg, 2009).

In the context of soil degradation and against the dominance of top-down, techno-scientific solutions, mulch emerges as a key infrastructure mobilized by agroecological farmers to take care of agricultural soils and their livelihoods (Lyons, 2020; Milazzo, 2025). But how does mulch work? On what temporalities does it operate? Who does it connect? And what kind of autonomy does it engender? I attend to these questions by combining scholarly literature on infrastructures, farmers' autonomy, agroecology and human-soil relations with autoethnographic fieldwork in a peripheral mountain area of southern Italy which has been subject to soil degradation for some time.

In agroecological farming, mulch is part of conceptions of soils as complex living systems – or 'foodwebs' (Puig de la Bellacasa, 2015, p. 702) – of which humans are part, and its mobilization is often part of a broader 'ethico-political stance or life proposal' (Lyons, 2020, p. 102) that embraces a concern for soils' degraded state and a desire to cultivate more autonomous forms of life based on intimate interdependencies with the Earth and its multiple beings (Ghelfi & Papadopoulos, 2022; Milazzo, 2025). Mulch *composition* essentially entails the gathering of organic materials on the surface of the soil, or around particular plants and trees, to form a covering layer that both protects and

nourishes crops and the soil. However, it is its *decomposition* that is of most interest to agroecological farmers and for ‘unearthing’ the generosity of this infrastructure.

Under the mulch layer, millions of soil organisms – from tiny bacteria, fungi and protozoans to spiders, ants, earthworms and woodlice – gather and begin an energetic feast. In an underground feeding frenzy, they break down the organic matter, they bind and aggregate soil particles, they ingest each other, defaecate, burrow and create channels; and through their movements and metabolic interactions they shape soil structure, regulate nutrient cycling and produce soil fertility (Lowenfels & Lewis, 2010). Assembling mulch allows agroecological farmers to work with the soil food web – or ‘team with microbes’ as Lowenfels and Lewis (2010, p. 204) put it – to maintain productive soils and grow socioecological realities in relative autonomy from productivist agricultural models and capitalist infrastructures (Lyons, 2020; Milazzo, 2025).

In addition to exploring how mulch is (de)composed as a generous infrastructure by agroecological farmers, I also enquire into what mulch *can do* – i.e. how its generosity operates within and across different farming contexts and communities. Exploring how mulch operates on the ground offers lessons beyond the particularities of the case-study by revealing the frictions, tensions and possibilities that generous infrastructures like mulch engender across different communities and contexts.

As a generous infrastructure, mulch can be easily improvised with accessible and affordable materials, and its (de)composition can contribute to growing autonomy by enabling generous exchanges and encounters between farmers and their soils. Importantly, taking the more-than-human worlds of mulch into account reveals the ways in which human-soil relations become material sites through which farmers’ autonomy is grown. However, mulch (de)composition is also ‘a space characterized by complex mutualist relations’ (Abrahamsson & Bertoni, 2014, p. 129) between humans and soils, and so growing autonomy with mulch also requires ‘making time’ for soils and their care (Puig de la Bellacasa, 2015, p. 695).

I argue that reframing mulch from a passive material to a generous infrastructure (de) composed by farmers and millions of soil organisms challenges notions of autonomy as an exclusively human achievement and foregrounds the relations of care between farmers and soils that are key to it. However, I also highlight the importance of not romanticizing generous infrastructures by drawing attention to the material, temporal and cultural complexities of mulch and to the tensions and challenges that it encounters in particular farming communities and contexts.

I begin by introducing the theoretical framework of the study, followed by a description of the research context and methods. I then unearth the generosity of mulch and I examine what it can do in productivist and environmentally degraded agricultural landscapes. I conclude by summarizing the main insights generated by the study.

## Minor and generous infrastructures in the ruins

In recent years, conceptualizations of infrastructure have proliferated alongside a growing concern for the role they play in sustaining and shaping socio-political life. Far from being passive material networks, infrastructures are increasingly conceptualized as ‘lively’ (Amin, 2014, p. 137) socio-material assemblages that emerge from the situated activity and

interactions of both humans and non-humans, and as sites through which power is produced and contested (Simone, 2004; Wakefield, 2018). Recent theorizations also point to different ways in which non-human beings and agencies are harnessed for different infrastructural projects, drawing a distinction between infrastructures in a 'major' and 'minor key' (Barua, 2023, p. 57; Krieg et al., 2020).

The former (major key) refers to infrastructures designed to accelerate capitalist flows, consolidate state power and propagate modern ideas of progress and development; whereas the latter (minor key) denotes forms of collaboration and improvisation between people and non-humans that become collective platforms for reproducing life at the margins of society and for projects of non-capitalist communing. Like populations of macaques repurposing roads and electrical grids to lay claim to a city (Barua, 2020); or trees rooting communities together and laying the groundwork for communities economies (Nadig & Fisher, 2020); or gecko-refuge gardens contributing to projects of ecological restoration (Krieg, 2020), minor infrastructures are often informal arrangements that emerge amongst the ruins left by capital, state and planning, and operate amidst precarious and uneven conditions. Still, the minor is also a language of 'rearrangement and variation' (Barua, 2023, p. 57), of openness and adaptability, of collaboration and care, and therefore it holds the potential for opening other ways of living within and beyond 'capitalist ruins' (Tsing, 2015; Wakefield, 2018).

The notion of 'generous infrastructures' (Papadopoulos, 2018, p. 203) adds to this growing literature by focusing on socio-material formations that contribute to creating and defending the autonomy of social movements and communities. They, too, are conceptualized in ecological and relational terms (Star, 1999), as complex 'alliances between *engaged* groups of animals and plants, *committed* groups of humans, and *accessible* material objects' that come together through a process of 'creative involution' (Papadopoulos, 2018, pp. 203–204, emphasis in original). This notion, borrowed from the work of Deleuze, draws attention to the becoming of infrastructures through human and non-human interactions and to the creative agencies that their association engenders.

Importantly, infrastructures' generosity rests on three key qualities. First, they need to be ontologically open and materially flexible. Unlike enclosed, private or state-owned and managed infrastructures, generous infrastructures are 'infrastructures of the commons' (Ghelfi & Papadopoulos, 2022, p. 694) that can be borrowed, shared, tweaked, modified, extended, connected to other infrastructures, and easily transferred across spatial and temporal locations. Hence, while their emergence is specific to particular communities, they can be composed and adapted to different contexts and environments. In other words, generous infrastructures are like 'a fluid object' (de Laet & Mol, 2000, p. 225): their boundaries are open and their configuration varies, and this fluidity allows them to travel, be adaptable, flexible, and responsive.

Second, infrastructures are generous if they allow social movements and communities to grow and defend their autonomy 'even when instituted infrastructures break down by failure or by intent' (Papadopoulos, 2018, p. 204). Autonomy refers to both a concept and a political strategy mobilized by scholars and social movements to redefine and reconfigure relations between individuals and communities *vis-à-vis* the state, global corporations and neoliberalism, towards self-management and self-determination (Böhm et al., 2010). In the farming context, autonomy has been conceptualized as a complex and unfinished process that encompasses both individual

and collective dimensions of farmers' lives, and it often occurs in contexts characterized by dependency relations, marginalization and deprivation (Stock et al., 2014; van der Ploeg, 2009). In agroecological farming, the idea and practice of autonomy is also closely connected to a peasant ethic and mode of farming, which evolve around food production, farm self-sufficiency and a deep connection and responsibility to the land, soils, animals and crops (Ghelfi & Papadopoulos, 2022; van der Ploeg, 2009). But I return to this later.

Finally, infrastructures are also generous in their capacity to trigger 'generous encounters' (Ghelfi & Papadopoulos, 2022, p. 686). These are affectively charged interventions that mediate between people for whom infrastructures are typically foregrounded, and those for whom they tend to be backgrounded. As Star (1999), observes, one of the properties of infrastructures is that they are 'learned as part of membership ... New participants acquire a naturalized familiarity with its objects, as they become members' (p. 381). In other words, by encountering generous infrastructures, people who are unfamiliar with them should be 'seduced' (de Laet & Mol, 2000, p. 235) into using them. Importantly, generous encounters can extend the 'reach or scope' of infrastructures 'beyond a single event or one-site practice' (Star, 1999, p. 381), allowing them to travel across spaces and times through materiality as well as the imagination.

However, how generous infrastructures are composed, how they operate, and whether they can produce more autonomous socio-material reconfigurations in actual places and times requires greater critical and ethnographic scrutiny. As Doherty (2019) argues, rather than romanticizing generous and other minor infrastructures: it remains critical to ask how and what worlds they sustain and make possible, on which registers and temporalities they operate, what regulatory and social norms support and undermine them, how they distribute power and what solidarities they engender across differences of all sorts, including species (p. 330). Moreover, a relational understanding of infrastructures requires attending to relations rather than predetermined essences to understand how and if generous infrastructures work. As de Laet and Mol (2000) argue for fluid technologies: as their boundaries and constitutions vary, so do their successes and failures. By analysing what generous infrastructures afford in specific places and how well they travel across contexts and communities, one can also uncover the frictions, tensions, negotiations, and possibilities that they engender.

## **Researching and farming with mulch in a ruined agricultural landscape**

This article stems from a larger research project into the agroecological practices of new farmers and it draws primarily from an autoethnographic investigation into practices of soil restoration. The main site of the research is my own smallholding located in a peripheral mountain area in the south of Italy<sup>1</sup> that has been subject to processes of depopulation and land degradation for some time (Forino et al., 2015; Salvati et al., 2014). As part of my efforts to restore the land and grow food in environmentally and economically sensible ways, I have engaged and experimented with mulch directly on my smallholding for seven years. The methodological approach of this study thus combines participant observation within the local farming community and context with my own experimental practice and sustained engagement with mulch as a practitioner (Carr & Gibson, 2017).

Given my intimate connection to the community and place under study, my ethnographic engagement was completely overt and it was directed to the study of the local agricultural context to better understand local ecologies, histories, farming practices and the wider cultural and regulatory landscapes in which they take place. It involved participating in local events and activities, talking to neighbours, residents, community leaders and farmers, as well as visiting their farms, and sometimes, working together and exchanging knowledge and resources.

Soil degradation in this area of southern Italy is the result of both environmental conditions (arid climate, clay soils, steep terrain) and socio-economic policies implemented over the last century to modernize and industrialize the agricultural sector (Forino et al., 2015; Salvati et al., 2014). The period between 1950 and 1970, in particular, saw a dramatic restructuring of these agricultural landscapes following multiple waves of outmigration and the adoption of productivist agricultural models and technologies that replaced agroecological practices such as crop rotations, polycultures, land fallowing and the use of animal manures (Pazzagli & Bonini, 2018). In this mountain ecology, the adoption of intensive agricultural methods and technologies like tillers, synthetic fertilizers and pesticides have caused the degradation of soils through processes of erosion, pollution, loss of organic matter and biodiversity (Forino et al., 2015; Pazzagli & Bonini, 2018).

Despite ongoing processes of land abandonment and soil degradation, agriculture remains a prevalent activity in the area. It is primarily practiced on small-scale, family-owned farms, at different level of intensity and involvement, and for both commercial purposes and subsistence needs. Most agricultural lands are on terraced hills, and they are dedicated to permanent woody crops such as olive trees, grape vines and fruit trees, as well as extensive forms of livestock farming. Notwithstanding the smallholding landscape, monocultures are widespread, soils are subjected to regular mechanical interventions, and synthetic fertilizers and pesticides are frequently used to increase productivity and efficiency.

To study mulch and its infrastructural generosity, I have also used my own corporeal experience and farming practice as a research method (Carr & Gibson, 2017; Wilbur & Gibbs, 2020). I have been engaged in soil restoration on my smallholding since 2018 and my research interest in mulch has emerged alongside my desire to live self-sufficiently on the land and grow food sustainably. However, for the first couple of years, it was incredibly difficult to grow any food without the use of mechanical means, enormous amounts of water and external inputs like fertilizers. The soil was a highly compacted heavy clay, incredibly hard to work with, lacking in organic matter and showing no visible sign of soil life. Over the years, through research, careful observation and by doing and failing many times, I gradually developed a 'feeling for the soil' (Sharp et al., 2025, p. 232) and the desire to take care of it.

I had encountered mulch before, in books, on friends' farms and in the forest, in the form of leaf litter, and I have always been fascinated by it. Beneath a layer of mulch, I would always find a rich, dark and crumbly soil, lots of worms and other critters; and the generosity of its simplicity and adaptability made it a sensible and practical choice. My understanding of mulch and its generosity is thus informed by my agroecological knowledge and values, and by my commitment to the land I live on and farm. While my situated and engaged perspective offers a specific view of mulch as it is mobilized within

a particular farming system and context, it has also allowed me to ‘make space for that which is sensed and felt, and with which we might form an attunement to – care for’ (Sharp et al., 2025, p. 233). In other words, it has enabled me to address questions of more-than-human agency, temporalities and embodied knowledge in practices of soil care and to be more receptive and sensitive to worlds co-inhabited by other living beings.

### **Agroecological farmers and autonomy: unearthing the generosity of mulch**

Agroecology has been defined as a science, a practice and a movement that combines indigenous and peasant knowledge systems with modern ecological and agricultural sciences to both research and enact more environmentally sustainable, socially just and economically viable food systems (Rosset & Altieri, 2017). Peasant farming and agroecology are therefore deeply intertwined, with many agroecological principles and methods originating from peasant knowledge systems and practices (Ghelfi & Papadopoulos, 2022). Among them is the idea and practice of autonomy which is mobilized to enable farmers and communities to self-organize and govern their food systems according to their needs and values, rather than being subordinated to external actors (the state, corporations, markets, etc.) (Böhm et al., 2010).

Broadly speaking, autonomy describes the ability to make decisions about one’s life and practices with as little constraints as possible from the state and other actors, but it is also used by farmers and agroecological movements, like La Via Campesina, as a ‘collective tool’ to resist the neoliberalization of agriculture and to realize collective interests (Böhm et al., 2010; Stock et al., 2014, p. 414). At the farm level, autonomy materializes ‘in and through agricultural production’ (van der Ploeg, 2009, p. 25), and more specifically, through the management of farming resources (land, soil, animals, crops, irrigation, buildings, knowledge, local community, etc.) and relations with outside actors (the state, corporations, agricultural and financial institutions, consumers, etc.). In peasant and agroecological farming, autonomy also emerges partly through what van der Ploeg (2009, p. 23) calls ‘forms of co-production’ between humans and living nature that enable farmers to reduce their dependence on external actors and unjust relations, and gain some relative freedom to act in such a way that farming is aligned with their interests and prospects. In other words, agroecological farmers experiment ‘with ways of knowing and forms of practice that involve the material world, plants and the soil, material compounds and energies, other groups of humans and their surroundings and other species and machines’; and in the process, they create infrastructures that can support and expand their autonomy (Ghelfi & Papadopoulos, 2022, p. 687).

Mulch is one such infrastructure – inspired by a peasant ethic of resource conservation and farm self-sufficiency – which is mobilized by agroecological farmers to repair and take care of agricultural soils (Lyons, 2020; Milazzo, 2025). As an agroecological infrastructure, mulch has a long and diverse history, having been widely used by farmers as a flexible and informal strategy to protect and replenish the fertility of soils using available material resources and by-products of the agricultural process, like animal manure, tree pruning, crop residues, straw, etc (Gliessman, 2007). For example, peasant communities across Europe used to collect leaf litter from nearby forests to use as animal bedding, and when it was saturated with urine and dung, they would apply it as mulch to fertilize crops (Farrell et al., 2000). Similarly, ‘slash/mulch’ practices common in tropical agroforestry systems, in

which woody vegetation is cut and mulched on site rather than discarded or burned, recycle carbon biomass and help maintain soil health (Thurston, 1997).

However, mulch is not limited to leaf litter and woody debris in its material composition and form. As a generous infrastructure, mulch is materially flexible and it can be composed with a variety of organic and inorganic materials, including pine needles, grass clippings, crop residues, straw, bark, woodchips, sawdust, home-made compost, animal manure, humanure, cover crops, seaweed, newspapers, cardboard, ash, stones, gravel, old natural clothing, and even plastic sheeting. Moreover, in its various material configurations, mulch can act as a weed suppressor, as a fertilizer, and as a temperature regulator; it can be used to reduce water evaporation as well as to prevent water runoff, soil erosion and compaction (Chalker-Scott, 2007). This material flexibility and ontological openness 'allows it to travel almost anywhere' (de Laet & Mol, 2000, p. 226) and to be composed, transferred, adapted and modified according to the contexts, specific needs and material resources of communities and ecologies.

Indeed, like the Zimbabwe bush pump studied by de Laet and Mol (2000), mulch is a 'fluid object' (p. 225) that has emerged in various places and times, in different configurations of farmers, materials, environments, knowledge and practices. From the subsistence-based leaf litter of European peasant communities (Farrell et al., 2000) and the 'slash/mulch' practices of tropical agroforestry systems (Thurston, 1997); to the ash and stone mulches of dryland environments (Lightfoot, 1996) and the living green mulches of ancient China (Paine & Harrison, 1993). Importantly, mulch is not the product of a single person 'but a result of collective action and of evolution over time' (de Laet & Mol, 2000, p. 249), and as an 'infrastructure of the commons' (Ghelfi & Papadopoulos, 2022, p. 694) it carries 'within it knowledge, material potentiality and learning without imposing it as a closed system' (Papadopoulos, 2018, p. 203).

However, this fluidity and generosity have also allowed mulch to be enrolled in industrial agricultural production systems in the form of polyethylene, and more recently, biodegradable plastic sheeting<sup>2</sup>. Plastic mulch is used to control weeds, conserve moisture and regulate soil temperature, and while it provides short-term benefits like earlier harvests, reduced labour costs and increased water-use efficiency, it is also one of the major factors contributing to the building up of micro-plastics in agricultural soils and a growing plastic waste problem (FAO, 2021; Steinmetz et al., 2016). I address this tension in relation to the material flexibility of mulch in a later section, but it is important to reiterate here that as the boundaries and configurations of mulch vary, so does its performance (de Laet & Mol, 2000).

In agroecological farming, mulch is more than a material or technical 'tool' used to increase a farm's economic productivity. Assembling mulch contributes to 'reincorporating bio-waste materials into economically and socially significant flows of transforming matter' (Krzywoszynska, 2012, p. 48), including the recycling of nutrients and closed material cycles which contribute to building farmers' autonomy. First, by re-integrating accessible resources and agricultural by-products back into productive soils as mulch, agroecological farmers can create their own organic inputs and reduce their reliance on synthetic fertilizers. Moreover, in hot and dry climates, mulch can create valuable micro-climates, reduce water evaporation, and by holding water like a sponge and releasing it over time, it can be used 'to water without water' – to use Pascual and Shwabe's (2019, p. 1) phrase – emancipating cultivation from increasing temperatures, recurrent droughts,

water cuts and infrastructural failures. Additionally, a thick layer of mulch can suppress weeds by blocking their germination or by promoting beneficial organisms that prey upon them or their seeds, eliminating the need for herbicides or tilling. Alternatively, mulching with cover crops can reduce weeds through competition, while also preventing soil erosion and adding carbon and nutrients to the soil (Chalker-Scott, 2007). Furthermore, by encouraging and protecting a diverse soil community, mulch can reduce soil pathogens, improve plants' resistance to pests and diseases, and feed crops without the need for pesticides and synthetic fertilizers (Lowenfels & Lewis, 2010). These effects can bring economic benefits to small-scale farmers and increase their resilience and autonomy against market and climate instabilities and infrastructural failures (e.g. water supply, synthetic chemicals and fossil fuels productions).

However, in agroecological farming, the soil is not just a material resource but 'a living web of interdependent beings' (Puig de la Bellacasa, 2014, p. 32) that requires practices of care (Shiva, 2008). So, when assembling mulch, agroecological farmers favour organic materials not simply because they can be self-produced and recycled within the farm, but because they contribute to the process of *decomposition* which is key to soil life and its regeneration (Lyons, 2020). Organic mulch thus enables agroecological farmers to nourish and protect a diverse biological community in the soil and to enrol its activity to maintain productive agroecosystems and grow autonomy.

Indeed 'all kinds of human and nonhuman activities and practices are brought together in and around' mulch (de)composition (Abrahamsson & Bertoni, 2014, p. 136). There are humans composting their kitchen and garden waste to mulch their crops *and* diverse communities of bacteria decomposing it and being ingested by protozoans and nematodes that release nutrients to plants. There are arthropods chewing and shredding woodchips laid out by humans around trees as mulch to retain water *and* fungi underneath digesting them and transporting nutrients across a complex underground network of plants' roots and hyphae. There are humans recycling cardboard and paper waste as mulch to stop weeds encroaching in their vegetable gardens *and* earthworms pulling it down, consuming it and releasing it into worm castings, fertilizing the soil and creating tunnels that improve water retention and aeration.

The work of mulch (de)composition is thus a more-than-human performance that challenges 'the binary between infrastructure built by humans and grown by nature' (Krieg, 2020, p. 2). However, this also means that mulch 'operates in the absolute dependence of the work of an unknown number of microscopic entities' in the soil (Milazzo, 2025, p. 50), and therefore it is not in farmers' control.

In what follows, I further explore how mulch is (de)composed by agroecological farmers and I examine how its generosity operates in the ruined agricultural landscape of southern Italy. I focus the discussion on the three key aspects of infrastructural generosity introduced earlier: ontological openness and material flexibility, autonomy and generous encounters.

## **The generosity of mulch in ruined agricultural landscapes**

### ***Between material flexibility and relational materiality***

As detailed previously, the materials that can be used to make mulch are as multiple and diverse as the sites, knowledge and practices from which it emerges

from. This material flexibility and ontological openness is a key aspect of its infrastructural generosity, allowing mulch to be composed, adapted and modified according to the needs and material resources of places and communities (Papadopoulos, 2018). Moreover, mulch can be easily improvised with materials that can be produced on a farm, gathered locally or acquired cheaply, making it an affordable option for small-scale farmers and enabling the reuse of local resources and waste streams.

Indeed, on my smallholding, I have composed mulch using disparate materials that were available locally and mostly for free, including cow manure acquired from neighbouring cattle farms, leaf litter and grass clippings collected in local villages, cardboard boxes gathered from local shops, woodchips produced from tree pruning, soiled straw from the chicken pen, cover crops and more. However, my research and experiments with mulch also suggests that not all materials are the same, and that mulch generosity partly depends on the wider networks of relations in which these materials are entangled.

For instance, animal manures, home-made compost and vermicompost are most effective in degraded soils because they carry a lively biological community that can replenish the vitality of soils; whereas plastic sheeting can only perform weed control and some soil protection, but they do not contribute to processes of decomposition. Moreover, while mulch simplicity and adaptability made it a sensible and practical choice for me, none of my neighbouring farmers use mulch. In fact, except for plastic mulch which is widely employed in polytunnel operations down the valley, organic mulch just isn't common in this agricultural area. This is partly because most organic materials that can be used to make mulch are generally considered 'waste' in both agricultural policies and wider cultural norms.

For example, cow manure is an abundant resource locally because there are several pastoralist families with small herds of cows that produce large quantities of it every year. However, most local farmers no longer use animal manure on their land because it requires time to mature to be used as fertilizer, its transport is burdened by costs and bureaucratic obligations, and some also question its safety. Cattle farmers use some of it to mulch and fertilize olive trees, vines and other crops on their land, but they struggle to dispose of the excess every year. Storing it according to regulation is costly, requiring the building of concrete pads and other bureaucratic inconveniences, so many end up pushing the excess manure to the edges of their lands or down ravines to dispose of it.

Animal manure draws attention to 'the relational materiality of bio-wastes' (Krzywoszynska, 2012, p. 48), showing that infrastructural materials are not so much 'matter itself' as 'matter engaged in relations' (Abrahamsson et al., 2015, p. 10). With regards to mulch, many organic materials produced on a farm like animal manure and other agro-food residues (e.g. olive and grape marc) are currently categorized as 'waste' in EU and Italian agricultural bio-waste policies. These regulations either forbid their use, or they strongly discourage it by making their storage, transport and disposal very costly and time consuming for farmers (Krzywoszynska, 2012). So while 'people have access to an affordable technology' (de Laet & Mol, 2000, p. 249), the use of mulch is actually hampered by regulations that prohibit or discourage the use and recycling of many agricultural by-products on farms. Animal manure thus begins to reveal some of the frictions and clashes that generous infrastructures may encounter in different socio-material contexts.

The case of plastic mulch, introduced earlier, also highlights the importance of ‘taking matters seriously’ in generous infrastructures by attending to their relations, including ‘where such matters come from and where they go’ (Abrahamsson et al., 2015, p. 4). Plastic mulch is entangled with the petro-chemical industry, micro-plastic pollution, climate change and a growing plastic waste problem (FAO, 2021), and while it may provide some short-term benefits for farmers, it does not contribute to growing autonomy. Plastic sheeting cannot be produced or recycled on a farm, and their repeated use can negatively affect soil communities and decrease agricultural productivity (Steinmetz et al., 2016). Paradoxically, in its plastic configuration, mulch is not an infrastructure of soil care, but a major driver of soil degradation. So plastic mulch also illustrates that the material flexibility and ‘striking adaptability’ (de Laet & Mol, 2000, p. 226) of generous infrastructures renders them available for co-option, and when they are appropriated for capitalist ends, they may stop being generous.

Together, animal manure and plastic suggest that even though mulch is materially flexible and open, it is also ‘entangled, in terms of both its performance and its nature, in a variety of worlds’ (de Laet & Mol, 2000, p. 227). Attending to mulch’s relational materiality (and not just its flexibility) reveals that while generous infrastructures are infrastructure of the commons that can be composed and adapted to suit the needs and resources of communities, their generosity is not predetermined. Instead, the outcome is ‘fluid’ (de Laet & Mol, 2000, p. 247) as each infrastructural configuration (e.g. organic, plastic, agroecological, industrial) enacts a different mulch and ‘whatever it does, it does in conjunction with other entities, enmeshed in a variety of relations’ (Abrahamsson et al., 2015, p. 10).

### ***Growing autonomy with care***

Besides their ontological openness and material flexibility, infrastructures are generous in their capacity to enable individuals and communities to build and defend their autonomy (Papadopoulos, 2018). As discussed earlier, autonomy in agroecological farming is a complex process that is built, at least partly, from forms of co-production between humans and living nature.

Mulch contributes to building farmers’ autonomy by providing them with a way to reintegrate available organic resources and by-products back into production processes (e.g. to fertilize crops, intercept and hold water, suppress weeds, protect and nourish soil communities), and in so doing, it can help farmers build their resource base (i.e. soil) and reduce their dependence on external actors and inputs (e.g. synthetic fertilizers, state and non-state infrastructures) (van der Ploeg, 2009).

However, as I noted previously, mulch is not simply about collecting and assembling different materials together on the surface of soils. It is also about decomposing them, and the work of decomposition relies upon the activity of a diverse community of microscopic and macroscopic life in the soil. As for the practice of vermicomposting (Abrahamsson & Bertoni, 2014), relations of feeding are key to mulching, and they entail making good decisions about which materials to use and how to apply them by attending to soil specificities and needs. For instance, cow manure turned out to be the most effective material for the highly degraded soil of my smallholding, adding desperately needed microbial life as well as large quantities of organic matter that can improve heavy

clay soils. However, the excessive use of animal manures in some environments can lead to soil acidification and nutrient deficiency; some sources may carry pathogens, diseases or be chemically contaminated; and when fresh, animal manures should not be applied near the stem or trunk of plants and trees. So, unlike the use of synthetic fertilizers or other agricultural ‘tools’ which often carry standardized knowledge, (de)composing mulch requires a more embodied and situated engagement with soils, materials and crops. Like vermicomposting, mulching ‘amounts to a precarious composition of different, yet potentially converging, activities and processes’ (Abrahamsson & Bertoni, 2014, p. 129) that require care rather than control.

Building autonomy with mulch is more like a process of *growth* in which farmers become attuned to the unique ecology of their soils and attentive to their needs in order to learn how to respond to them with mulch (Abrahamsson & Bertoni, 2014; Krzywoszynska, 2019; Milazzo, 2025). However, unlike building, ‘the rhythms of growing cannot be accelerated much’ (Krieg, 2020, p. 6). Indeed, the temporality of soils and the pace of their renewal is remarkably slow relative to anthropocentric timescales, and it also takes time for ecological relations to be (re)established (e.g. between fungal communities and trees).

On my smallholding, it has taken four years for the first signs of improvements to emerge, but plants’ performance and productivity is yet to fully recover. Nevertheless, after seven years of using various mulches, I have been using significantly less water for irrigation in the summer, I spend less time weeding, and the highly degraded soil is slowly turning into a productive medium for growing food without the need for agrochemicals or mechanical interventions. Wherever I applied cow manure as mulch, the soil has become darker, crumblier and full of earthworms, requiring little physical work and no chemical fertilizers. The woodchip mulch is effective in smothering weeds and holding moisture, and it shelters numerous critters, from woodlice and springtails to millipedes and spiders. Moreover, with a regenerated soil community, birds, lizards, prey mantis, dragonflies, snakes and other predators have gradually returned, and they are helping with managing the populations of insects without the need for pesticides. A more diverse vegetation is also beginning to grow, and a variety of mushrooms and mycelium hyphae are emerging, indicating the formation of symbiotic relations between plants, trees and soil communities, making plants stronger, less vulnerable to diseases and pests, and productive without the need for excessive irrigation, fertilizers or pesticides.

While mulching is a choice made by humans to safeguard soil fertility and grow autonomy, by sustaining soil ecosystems and their wider webs of relations, mulch has also created the conditions for the reproduction of other forms of life on the land, from fungi and bacteria to plants and animals (Krzywoszynska, 2023). So, beyond positive effects to humans, my experience with mulch suggests that its generosity also extends to other species and it can lead to ‘interspecies experiments of more-than-human landscape-making’ (Tsing, 2015, p. 6) where not only humans, but entire agroecologies strive to transform the conditions of their shared existence (Lyons, 2020). Indeed, ‘making worlds is not limited to humans’ (Tsing, 2015, p. 22) and in the process of mulch (de)composition other forms of life move in and add to the agroecology, creating more diverse and complex food webs in which many – besides humans – can thrive. Importantly, mulch (de)composition diffuses agency among different entities and processes in and above the soil, and it shows generosity to be ‘a relational matter dispersed in

the connections and labor among people, as well as other kinds of beings and things' (Lyons, 2020, p. 134).

However, as Krzywoszynska (2023) notes, soil attentiveness and care is not only challenged by the limits of embodied perception, but also by collective framings and valuations that shape farmers' ethical regard for soils. Modern farming practices and knowledge have been built on the invisibility of soils and so practices of soil care, like mulching, are not common in more conventional agricultural networks. Moreover, in industrial agricultural systems, the needs of soils often clash with the needs of the farm business, and farmers are constrained in their choices by regulations, markets and the wider network of relations in which they are entangled (Krzywoszynska, 2019). For instance, many organic producers in my area would like to use animal manure acquired locally on their land, but they would risk losing their organic certification because it is not a 'certified' product. Additionally, the benefits mulch can generate for farmers are not as immediate as when using synthetic fertilizers, pesticides or weed killers, and this creates a temporal clash with industrialized agriculture's productivist orientation and the way broader agro-food economies are organized (Krzywoszynska, 2019; Puig de la Bellacasa, 2015). This suggests that mulch generosity is also dependent upon farmers' knowledge and ability to take care of soils, but the wider relations in which individual farmers are entangled can influence on-farm temporalities and limit farmers' agency to enact practices of care (Krzywoszynska, 2019).

### ***Encountering mulch's generosity***

Another way in which infrastructures can be generous is by instigating encounters that can induce or mobilize people into adopting them, and in so doing, share and extend their generosity across places and communities. As Star (1999) observes, 'strangers and outsiders encounter infrastructure as a target object to be learned about', and as they acquire familiarity, newcomers may 'become members' (p. 381).

While none of the farmers I have spoken to in my local area know about mulch or use it themselves, when encountering it on my smallholding, it was almost impossible not to discuss what mulch is and what it can do. During these encounters, most people were instinctively curious about the gathering of what are generally considered 'waste' materials and wondered about their use and function on a farm. However, while some were familiar with using firewood ash to mulch and fertilize crops, not many were keen on using cardboard boxes or other 'waste' materials on their lands. As for tree pruning, leaf litter and other organic debris collected throughout the winter, most people prefer burning rather than mulching them to prevent the spread of fungal and bacterial diseases<sup>3</sup>.

Encountering mulch on my smallholding has thus produced a variety of affects, from scepticism to curiosity, but the (de)composition of mulch has also created situations for the sharing of knowledge and materials. For instance, the use of cow manure has stimulated regular collaborations with local families of cattle farmers, and the neighbour who was initially sceptical about '*a little leaf*' has since been gathering and bringing tree pruning to my smallholding to process into woodchips. Moreover, exchanges like the one that begins this article have been common and, sometimes, they have triggered longer conversations and discussion on practices of soil care and restoration. For example, the

use of cow manure has often sparked lively discussions over the advantages and disadvantages of using such rich nourishment on the land, and it has evoked memories of older farming practices, when the use of animal manure was more common. Collecting tree pruning and processing them into woodchips has also sparked interest and prompted conversations on practices of mulching organic materials versus burning them. So, assembling and using mulch on my smallholding has also opened new channels of communication and it has encouraged unexpected forms of cooperation with neighbouring farmers.

However, directly encountering mulch did not – on its own – promote a better understanding of the interconnections between living soils and farmers' autonomy, nor did they directly stimulate an ethical regard for soils (Pitt, 2018). As noted earlier, attention to soils is partly challenged by the limits of human embodied perception, so on many occasions I have used mulch as a material intermediary to talk specifically about soils as complex living systems requiring care and to draw attention to the agency of '*a little leaf*' and its decomposition. Mulch can thus act as a site where people, farmers, plants and soil biota meet, share knowledge and exchange materials, but the generosity of these encounters is partly dependent on the actors who brings them into being (de Laet & Mol, 2000). Embodied encounters with mulch can be mobilized as pedagogical tools to direct attention to processes within the soil and to create situations from which an ethic of soil care can arise (Krzywoszynska, 2023), but their success is not guaranteed. In some cases, mulch may work, but in others it 'may fail to marshal a community around it' (de Laet & Mol, 2000, p. 245).

In my community, encountering mulch has only inspired minor reconsiderations and adjustments to local practices, and many farmers remain sceptical and very reluctant to use mulch. On one hand, they question its convenience and safety due to the work it needs to be assembled, the time it requires to produce benefits and its association to 'waste' in regulatory frameworks and wider cultural norms. On the other hand, as Krzywoszynska (2023) argues, (in)attentiveness to soils is also a societally structural issue which is shaped by collective framings and valuations of soils. After decades of policies promoting agricultural productivity through the intensive exploitation of soils, many farming practices like tilling, spraying, clearing vegetation and burning organic debris have become part of local farmers' identities as 'good farmers' (Burton, 2004). In other words, soils continue to be invisible in many agricultural networks, and so even though mulch makes sense for small-scale agroecological farmers, it may 'fail as a connecting element in larger [farming] communities' (de Laet & Mol, 2000, p. 252).

Nevertheless, cultivating soil attentiveness also requires the training of individual embodied perception, and encountering mulch can trigger new social interactions that have the potential to reveal 'new aspects of the world' (Puig de la Bellacasa, 2014, p. 34) to the newcomer, including the multispecies relations that sustain farmers' autonomy. However, the work that mulch can do in expanding the landscape of ethical relations with soils and growing farmers' autonomy also depends on the relations of (inter)dependence in which individual farmers and communities are entangled. Mulch generosity is thus 'unevenly distributed and always already composed of situated trajectories of human-soil ruptures and collaborations' (Lyons, 2020, p. 65). Extending mulch generosity to larger farming communities necessitates new imaginaries of soils that frame them as worthy of

ethical consideration as well as wider regulatory changes that revalue bio-waste materials and promote agroecological solutions like mulch for their management (Krzywoszynska, 2012, 2019).

## Conclusion

In this article, I have theorized mulch as a generous infrastructure mobilized by agroecological farmers to take care of soils and I have examined its potential to foster more autonomous ways of farming in ruined agricultural landscapes. Working with Papadopoulos (2018) concept of 'generous infrastructure' and experimenting with mulch on my own smallholding and community, I have offered a theoretical and empirical exploration of a 'minor infrastructure' (Barua, 2021, p. 16) capable of assisting in the slow, but vital, tasks of growing soils and farmers' autonomy.

As a generous infrastructure, mulch can be easily improvised with accessible and affordable materials and its (de)composition allows farmers to grow autonomy by cultivating interdependencies with the worlds of soil. Mulch (de)composition can also generate situations and encounters that can help cultivate attentiveness to soils (Krzywoszynska, 2023), but as an infrastructure dependent on the world-building activities and temporalities of soils, its generosity requires time to grow and for farmers to build relationships of care with their soils.

The analysis also reveals that the generosity of mulch is neither given, nor fixed to its ontological openness and material flexibility. Instead, it emerges from the materials, values, knowledge and practices of both humans and non-humans that (de)compose it, and it is shaped and catalysed by regulations, cultural norms, farmers' knowledge and the wider networks of relations in which they are entangled. Infrastructures' generosity can thus be unequally distributed, with structural forces and existing relations of (inter)dependencies mediating and constraining their access, knowledge and use across different communities and contexts.

Indeed, the temporalities of mulch (de)composition clash with the productivist orientation of industrialized farming systems and the way broader agro-food economies are organized. Nevertheless, the mulching practices of agroecological farmers highlight the importance of investing in the future by building soil fertility and new structures of possibilities for both humans and non-humans living in ruined agricultural landscapes (Milazzo, 2025). Moreover, in the (de)composition of mulch, and in the generous encounters it generates, lies the potential for cultivating community collaborations, shared learning, experimental practices, and new imaginaries and dispositions towards soils. Ultimately, generous infrastructures like mulch cannot address the systemic and structural issues that affect communities living amidst capitalist ruins, but they can begin the work of 'repairing ruptured relations and cultivating relations that have yet to come' (Lyons, 2020, p. 31) through their materiality, but also by cultivating the imagination – *'a little leaf at a time.*

## Notes

1. The precise location of the case-study area is omitted to protect the anonymity and privacy of those connected to the author.

2. The use of plastic mulch in agriculture dates to the fifties and it has increased massively since, being the second largest use of plastic films in agriculture by volume and exceeding 2 million tons globally (FAO, 2021).
3. In the local area, there is also a tradition to burn all organic waste materials gathered over the winter in big open fires on March 19<sup>th</sup> to celebrate Saint Joseph.

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