

# *Better to be a pig dissatisfied than a plant satisfied*

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# Better to be a Pig Dissatisfied than a Plant Satisfied

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## Abstract

In the last two decades, there has been a blossoming literature aiming to counter the neglect of plant capacities. In their recent paper, Miguel Segundo-Ortín and Paco Calvo begin by providing an overview of the literature to then question the mistaken assumptions that led to plants being immediately rejected as candidates for sentience. However, it appears that many responses to their arguments are based on the implicit conviction that because animals have far more sophisticated cognition and agency than plants, and that plants should not have the same moral status as animals, plants should not have any moral status. Put in simpler terms: it is not as bad to eat plants than to eat, say, pigs. While there are still uncertainties around comparative moral and policy implications between animals and plants, given a gradualist account of quasi-sentience and partial moral status, both of which we claim are a matter of degree, we may not have to abolish our convictions by declaring that plants have no sentience or moral status at all. Indeed, we can hold two things at the same time: that animals and plants have moral status, but animals have *prima facie* more moral status than plants.

**Keywords** Sentience · Plants · Animals · Moral status · Consciousness

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## Introduction

In their recent article, Miguel Segundo-Ortin and Paco Calvo (2023) review a lot of the evidence that they claim showcases plant behavioral, cognitive, and developmental capacities. Their review is done in order to make the sentience research community take seriously (i) the idea that plants could be possible candidates for sentience, which is sufficient to imply (ii) that plants could have moral status.<sup>1</sup> Briefly, and most generally, sentience is the capacity for subjective experiences and moral status is to have intrinsic moral value (Browning & Birch, 2022; DeGrazia, 2021). However, many critical replies to Segundo-Ortin and Calvo (2023) seem to rest on the implicit conviction that animals and plants should not be assigned equal sentience and moral status, because plants do not matter as much as animals, ultimately denying both (i) and (ii) to plants. Yet, there is a more conciliatory, yet defeasible, position that we want to articulate: plants may morally matter more than we have historically assumed, but animals may still morally matter more than plants. We will thus here critically examine our position using the potential for a gradualist view of sentience with a moral status that admits of degrees.

Our modest goal, then, is to explore whether it is plausible, or makes sense to say, that plants may have something we are calling ‘quasi-sentience.’ Typically, many in the debate appear to assume that entities either have sentience or lack it entirely. From an evolutionary perspective, however, such a stance is questionable since all complex traits come in degrees (Veit, 2023a). Relatedly, we also explore whether plants may have partial moral status, or the minimal morally relevant interests that provide some reason for moral agents to have minimal moral obligations (Terrill, 2021).<sup>2</sup> This would make them distinct from, say, stones. Nevertheless, we need not put plants in the same degree(s) of moral status and sentience as animals. At the same time, we acknowledge how very much contested and controversial the plant sentience literature (as well as the related literature of plant cognition, plant intel-

<sup>1</sup> While Segundo-Ortin and Calvo do not use the concept of ‘moral status,’ it is nevertheless implied given their claim that “the ethical implications for our treatment of plants will need to be considered too” (ibid.).

<sup>2</sup> Some may ask why we invoke sentience, or even moral status, at all for plants. After all, per an anonymous reviewer’s suggestion, there are reasons other than sentience and moral status that we may normatively value plants. First, we take it for granted that there are *instrumental* moral reasons to normatively value plants. For example, if “the presence of plants has a significant positive impact on, and may even be indispensable for, [human] mental health and well-being” then we ought seriously consider cultivating plant life that thrives without unnecessarily destroying said life for the sake of human mental health and well-being (Višak, 2018, p. 38). This, in turn, would have positive moral implications for the treatment of plants without invoking sentience or moral status. However, our paper is an exercise in thinking about the *intrinsic* moral reasons to normatively value plants *qua* plants, even if it also touches on some issues relevant to instrumental reasons like environmental policy. And because sentience bears significant moral weight right now given that sentience is at the very least a precondition for having interests which plausibly ground (at least some) moral status, and we do not think plants have a strong degree of what may be called sophisticated sentience, then plant quasi-sentience is a worthwhile intrinsic reason for considering the (partial) moral value of plants. Of course, there are also intrinsic moral reasons to normatively value plants *qua* plants with different grounding accounts of moral status, e.g., agency, group membership, a multi-criteria account, etc. (Timmer, 2023). We leave this option aside in the paper. For our purposes, sentience provides an ecumenical normative explanation.

ligence, etc.) really is. Let us, then, more strongly state our conditional argument: if the proponents of plant sentience are possibly right, such that plants may have the rudimentary, minimal capacities to have some subjective experiences, and sentience grounds moral status, then plants may have some moral status whereby moral agents may have some moral reason to consider plant interests. The upshot is that plant interests are on a smaller magnitude relative to animals due to the possibility of plant quasi-sentience and partial moral status.

We situate our paper by first clarifying relevant concepts that will be helpful to, second, wade through the recent back-and-forth literature between advocates of plant sentience and their corresponding critics. Next, we introduce our assumptions about sentience and moral status to subsequently narrow in on the problem of how to incorporate plants into our expanding moral circle without necessarily trivializing the work done in animal ethics (Brooks Pribac, 2023; Milburn, 2023). Resulting from Segundo-Ortin and Calvo's closing hope "that plant-related ethical decisions will be on the agenda in the future, or at least that the research findings [...] are taken into account in the measures adopted for the protection of flora," we conclude with some moral and policy considerations regarding the treatment of plants should the evidence of plant quasi-sentience and partial moral status be taken into consideration (2023, p. 19).

## Background

Before we dive into the main arguments of this article, we will begin by clarifying the core concept we are employing here, and subsequently offer a brief overview of why the idea of plant sentience should at least not be immediately rejected from the armchair.

### Clarifying Concepts

For both animals and plants, there are often charges of unclarity when utilizing specific concepts to discuss relevant capacities, including definitional challenges around concepts like 'sentience,' 'cognition,' 'intelligence,' 'awareness,' *inter alia* (Solé, 2023; ten Cate, 2023). For transparency and clarity, it is necessary that we systematize our definitions to distinguish our target concept, namely sentience, from the rest of the field.<sup>3</sup>

Given the scope of our paper, we are entirely interested in sentience, which may either broadly refer to phenomenal consciousness or any type of valenced/subjective experience (call this  $S_{\text{BROAD}}$ ), or narrowly refer to valenced subjective experiences with positive and negative feelings (call this  $S_{\text{NARROW}}$ ) (Browning & Birch, 2022,

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<sup>3</sup> We would like to thank the anonymous reviewers from the *Journal of Agricultural and Environmental Ethics* on pushing us to clarify our concepts. While we do clarify, we do not think these concepts pick out nicely delineated natural properties. They likewise have fuzzy boundaries and come in degrees (and varieties).

p. 1).<sup>4</sup> While the literature on animal sentience has primarily focused on pain and pleasure, i.e.,  $S_{\text{NARROW}}$ , we should be epistemically open to the possibility that the traditional metrics do not perfectly cohere with the possibility of plant sentience. This is to say that sentience may be more than just pain, even if pain is a helpful place to start. Segundo-Ortin and Calvo assume that “‘Sentience’ refers to the capacity of an individual to have felt states, including sensory experiences, external or internal” (2023, p. 1). We believe that  $S_{\text{BROAD}}$  captures Segundo-Ortin and Calvo’s (ibid.) referent. Thus, we similarly adopt  $S_{\text{BROAD}}$  in our paper.<sup>5</sup>

Cognition arguably has even less of a settled definition than sentience. But, again following the lead of Calvo and Segundo-Ortin (2023), cognition generally entails adaptiveness, anticipatory behavior, flexibility, goal-directedness, etc. (Calvo & Lawrence, 2023, pp. 69–70), and may be a possible indicator of sentience. But cognition is nevertheless separable, since “cognition, *by itself*, does not imply sentience. It follows from this distinction that plants could be cognitive (not automata) without being sentient” (Calvo & Segundo-Ortin, 2023). At this point, it is helpful to state that we think the term cognition perhaps refers to a cluster of different concepts, most of which do not provide hard boundaries and – as we will articulate with sentience – come in degrees (Allen, 2017).

Intelligence (or sapience), like cognition, is vague at best. Regardless of how we define sapience, of the aforementioned set of capacities, sapience and sentience tend to be considered the most different. Consider the following: “Imagine angels who are conscious but, lacking feelings, not sentient, and who have the aim of performing certain actions simply because they are right. Even if they do not feel good upon achieving their aims or bad if their aims are thwarted, they have interests in noninterference” (DeGrazia, 2021, p. 43). We may assume that the imagined angels are sapient here, i.e., rational yet non-affective beings.<sup>6</sup> However, it is a further question whether sapience of this kind is sufficient for moral status (Shepherd, 2024). Given cases like this, we may reasonably separate sapience and sentience. Finally, regarding awareness, by definition, for either  $S_{\text{BROAD}}$  or  $S_{\text{NARROW}}$ , some argue that it is necessary that “All sentient beings have states of awareness” (DeGrazia, 2002, pp. 40–41). Still the question remains: what about quasi-sentient beings? For convenience, given our context-relativized claims of quasi-sentience, we will again separate awareness from sentience.<sup>7</sup>

<sup>4</sup> For a commensurable BROAD/NARROW conceptual distinction for partial moral status, as it corresponds to sentience, see Terrill, 2021, pp. 196–198.

<sup>5</sup> Of course, the entirety of our adoption is haunted by the unsettled nature of sentience, as well as the specter of consciousness, “because the scientific study of consciousness has not reached a consensus about what consciousness is, and how we can tell whether or not it is present” (Basl and Schwitzgebel, 2019). Nevertheless, we premise that sentience (and more specifically,  $S_{\text{BROAD}}$ ) is what (morally) matters most here, and fits our normative intuitions, while also having the conceptual virtues of explanatory strength and simplicity.

<sup>6</sup> If preferred, another common case of sapience without sentience is that of the Vulcans from *Star Trek* (see Roelofs, 2022 and Shepherd, 2024).

<sup>7</sup> Like cognition and sentience, we are pessimistic about the idea that we can have sharp boundaries for many concepts in philosophy more generally, including sapience and awareness. Additionally, vague concepts need not be an obstacle to inquiry.

## Why Take Plants Seriously?

Modern plant science both acknowledges and seeks to overcome what is known as ‘plant awareness disparity,’ which is the tendency to overlook plants due to differences in timescales between plant and animal behaviors, our finite visual processing power, and socio-historical beliefs (e.g., that plants are merely machines) that make it challenging for humans to even consider the unique biological features of plants – let alone imagine what plant sentience might be like (Allen, 2003; Calvo & Lawrence, 2023, pp. 25–29; Gerber & Hiernaux, 2022; Parsley, 2020; Plebe, 2023). Part of Segundo-Ortin and Calvo’s (2023) project, then, is to convey recent advancements in plant science to demonstrate that plants exhibit complex and diverse behaviors which challenge traditional anthropocentric and zoocentric views that ground plant awareness disparity. *Contra* said views, “Plants and their root networks of symbionts are proactive engineers of their environments” and encompass a wide range of responses, including positive geotropism in roots and positive phototropism in shoots (Calvo & Lawrence, 2023, p. 210). Plants, being more sessile entities, are also much more sensitive to specific environmental cues:

“A central trade-off in decision-making is that of speed versus accuracy, as defined by Fitt’s Law. A seed that germinates too early in the spring can die from exposure to frost, while germinating too late can lead to being shaded out by competing plants. In light of the timescales across which plants develop, and the largely irreversible nature of the decisions they take, decision-making is likely skewed toward accuracy over speed to support maximal fitness” (Davis et al., 2023, p. 4).

While there is currently no evidence for a central information integration system in plants, notably, through aggregate and asynchronous individual cells, plants seemingly have a decentralized information-processing architecture that nevertheless reaches unified and collective decision-making features (Davis et al., *ibid.*; Segundo-Ortin and Calvo, 2023). Yet, it is unclear “How the developmental states and identity of individual cells in a plant tissue are turned into a collective organ-level transition” (*ibid.*, p. 10). Such information-processing helps in developing strategies for nutrient acquisition and may be influenced by interactions with competitors. This aligns with the concept of ‘biological rationality,’ benefiting all evolutionarily successful life forms, including plants (Melis and Monsó, 2023).

Segundo-Ortin and Calvo (2023) reveal parallels in both biological features and behaviors shared between animals and plants, including the nervous and vascular systems. They (in)famously endorse and utilize the ‘plant neurobiology’ framework for studying plant intelligence and sentience, which focuses on information integration and physiological coordination through electrical signaling (Calvo, 2016). While there are reasons to be agnostic about frameworks like plant neurobiology, especially given the unique challenges of defining cognition in plants due to their decentralized nature, Segundo-Ortin and Calvo (2023) argue that plant neurobiology helpfully explains similar functions found in both animals and plants (Bennett, 2023; Rouleau & Levin, 2023). When taking the plant neurobiology framework seriously, research

shows that plants can: be anaesthetized, anticipate events, assess risks, communicate, distinguish between kin and non-kin, interact with their niche environment, learn from past experiences, and make adaptive decisions (Calvo & Lawrence, 2023; Segundo-Ortin and Calvo, 2023). While there is a large array of interesting behavioral examples of plants, which Segundo-Ortin and Calvo (ibid.) deem as cognitive abilities that undergird the potential for *sui generis* sentience, further research is necessary.<sup>8</sup> Still, some specific interesting behavioral examples include the demonstration of an advantage in foraging due to epigenetic memory of previous interactions in the case of clonal plants and the ability of the *Boquila trifoliolata* to mimic the leaves of its supporting host as a predation avoidance strategy (Gianoli & Carrasco-Urra, 2014). Moreover, the Venus flytrap's stimuli from its trigger hairs before closing possibly demonstrates numerical counting abilities (Böhm et al., 2016; Hedrich et al., 2016). Interestingly, when certain studied plant species – including tomato plants – undergo stress in conditions of cuts, droughts, and herbivores they “emit remotely detectable and informative airborne sounds” via their tracheas, as well as volatile organic compounds, which *inter alia* “may reveal a pathway of signaling between plants and their environment” (Khait et al., 2023, pp. 1334–1335).

While animal sentience has been extensively studied and recognized across a wide range of species, including invertebrates, plant sentience remains a burgeoning field (Birch et al., 2021). And just as the assessment of animal sentience is employed using credences, inferences, and other kinds of markers, so too might we assess plant sentience in the same way. However, “there is a double standard: behavioural patterns associated with subjective experiences in humans are considered valid for inferring [sentience] in non-human animals but not in diverse other systems including plants” (Rouleau & Levin, 2023). Of course, this represents one of the many challenges that persist when investigating sentience in any non-human entity. Notably, the evolutionary distance between plants and humans need not preclude the potential for plant sentience, especially considering recent work that suggests the possibility of sentience in insects, despite distinct neural structures (Barron & Klein, 2016; Mikhalevich & Powell, 2020). After all, if the ‘cellular basis of consciousness’ is correct, and it is the case that sentience benefits entities in terms of adaptation and complexity, then sentience may have evolved in prokaryotes, which is much earlier than the Cambrian explosion (Baluška & Reber, 2019).<sup>9</sup> One option, articulated by Tilo Henning and Moritz Mittelbach (2023), is to propose that plant sentience may be the null hypothesis, given plants’ anticipatory learning, complex behaviors, and decision-making capabilities.

Again, further research to determine whether plants determinately possess sentience or conscious awareness is needed. Research, then, should be done with caution and without biases, where countering biases may entail incorporating non-anthropo-

<sup>8</sup> Note that we never claim that complex behavior proves cognition, which in turn possibly proves sentience. But it does shift the evidential burden for thinking they have the latter things.

<sup>9</sup> This is especially true if the nature of evolution is conservative because once sentience emerged at an earlier time it would have been conserved. Either way, plant sentience still needs to come to terms with Darwinian principles of research and development being expensive, every design being paid for, and the fact that evolution uses previous designs (Dennett, 2003).

centric and non-zoocentric approaches in methodologies while carefully balancing both the denial of an ‘anything-goes’ approach and rejecting the *Scala Naturae*.

## Criticisms: Concerns About Plant Sentience

Despite developments in plant science, many remain skeptical about plant sentience and its investigations.<sup>10</sup> Below, we briefly review the broader landscape of critics who respond directly to Segundo-Ortín and Calvo’s (2023) article and end with more specific criticism that will inform the rest of our paper.

Some critics who argue against plant sentience use the same oft-used conceptual tools against animal sentience. First, some invoke the principle of parsimony (i.e., ‘Occam’s Razor’) to suggest that simpler explanations, rooted in physiological or biochemical processes, might account for plant behavior more effectively than attributing sentience at all (Mallatt et al., 2023). Second, any claim of sentience conferred to non-human entities will, in turn, receive a charge of anthropomorphism and the need to avoid it (Carls-Diamante, 2023; Robinson et al., 2023).

Other critics who argue against plant sentience direct more specific challenges, including the contention that the argument based on analogy between animal nervous and plant vascular systems is misleading due to fundamental intractable physiological and biological differences (Damasio & Damasio, 2023; Dołęga et al., 2023; Gutfreund, 2023; Struik, 2023). For example, while plants may sense and respond to stimuli, they appear to lack the requisite structures necessary for conscious experiences to arise, thus making sentience unlikely (e.g., necessitating formal biological brain structures).<sup>11</sup> Even if plants do have biological parts akin to neurotransmitters, critics also argue that it is unclear whether those similarities give rise to anything beyond simple, non-conscious, input-output functions (Booth, 2023). Moreover, the fact that plants may sense and respond to stimuli, and lose sensory responses under anesthesia, may not necessarily say anything substantive about sentience – so behavioral evidence may fall flat (Damasio & Damasio, 2023). Finally, while some plant capacities may be considered cognitive, Dung (2023) emphasizes the need for evidence that directly addresses the question of plant sentience, rather than general cognitive complexity. Plant capacities might, after all, not meet the criteria for attributing sentience to plants, especially in comparison to more credible evidence of animal sentience.

However, most of the criticisms so far have neither fully addressed (a) the possible positive implications of Segundo-Ortín and Calvo’s (2023) article (i.e., what if plants are sentient? If plants are sentient, how should moral agents  $\phi$  in relation to plants?), nor fully addressed (b) the moral status question (i.e., if plants are sentient, do they have moral status? If so, what kind of moral status?). Those who have addressed

<sup>10</sup> For instance, in the 2020 PhilPapers Survey question about other minds, specifically for which groups are some members conscious, 7.23% of philosophers accept or lean toward accepting plants (<https://survey2020.philpeople.org/survey/results/5106>).

<sup>11</sup> An interesting question arises here that we nonetheless leave open: if one concedes that sentience in artificial intelligence is a possibility without biological substrates, does it entail conceding the possibility of plant sentience without an exact 1:1 biological substrate?



(a) have either articulated a narrowly focused yet important worry on the implications around ethical veganism and dietary choices (Milburn, 2023; Tiffin, 2023), or explored methodological learnings that may be applied in comparative cognition (Carls-Diamante, 2023; Pessoa, 2023). For instance, Milburn (2023) discusses how ascribing sentience to plants could lead to dilemmas even for ethical vegans and prompt a morally overburdensome world – perhaps to the point of human extinction – in how humans interact with the plant kingdom. Simona Ginsburg and Eva Jablonka (2021) and Brooks Pribac (2023), meanwhile, acknowledge the resilience of plant life but worry about applying ‘sentience’ to plants, especially in communication with a broader audience, as such ascriptions may stall or reverse the progress made in animal ethics.

We believe there is a relevant gap. In particular, the idea in play here that we will tease out is that “The possibility that plants may be able to feel some states does not necessarily mean that their sentience needs to be equated to that of other-than-human animals” (Calvo & Segundo-Ortin, 2023). The rest of our paper will briefly respond to both (a) and (b), while making the case that plant sentience need neither be morally overburdensome nor pose a threat to animal ethics.

### **Assumptions: Gradualism, Degrees, and the Conceptual Link Between Sentience and Moral Status**

We first assume *A1: gradualism about sentience*. This amounts to a claim that sentience is a spectrum that comes in degrees (Veit, 2023a, p. 95). It is not an ‘on’ or ‘off’ matter, but a complex bundle of capacities that exhibits great individual variation even within our own species.<sup>12</sup> Once we look at sentience across life more generally, of course, this phenomenological complexity will only be greater (Veit, 2023b). Because sentience is complex, fuzzy, and vague at best, it is a mistake to think that it is merely a threshold concept separating the haves and the have-nots of sentience (Veit & Huebner, 2020, p. 2). As Daniel Dennett once usefully put it, there can be “hemi-semi-demi-pseudo-proto-quasi-minds” (1995, p. 108) that lack some of the properties we associate with human minds but help us to understand where our minds come from. The same can be said for sentience. A gradualist picture of sentience includes a range of entities with some rudimentary form of sentience that only have some of the properties we associate with sentience (or quasi-sentience) on one end, to entities with more complex and sophisticated sentience on the other end – like higher-order satisfaction or frustration (Warren, 1997, p. 55).

Next, *A2: plants may be quasi-sentient*. While it may be difficult to imagine plants having any degree of sentience at all, especially given the disagreements between the advocates and critics of plant sentience seen in the previous two sections, it is certainly true that we need to continually update our understanding of sentience. If we think of sentience as a spectrum along an axis on a Cartesian coordinate system,

<sup>12</sup> While there may be big gaps between complex behavior and cognition, and cognition and sentience, these are nevertheless gradual transitions that depend on each other (at least for animals, though maybe not machines).

“either with or without an ‘absolute zero,’” then plants may fall at the far left-hand-side of this continuum with such faint feelings that we could not even imagine them from our phenomenologically rich human point of view (Godfrey-Smith, 2018, p. 216). Indeed, the idea that quasi-sentience exists is salient if we buy into the “bottom-up, evolutionary view of sentience” (Segundo-Ortín and Calvo, 2023, p. 3) because it again acknowledges differences between not only species but also kinds of entities, rather than hard thresholds of sentience (Browning & Veit, 2022, p. 311; Godfrey-Smith, 2020; Veit & Huebner, 2020). While we remain agnostic about the grounding account of plant sentience, we believe that the current inferential evidence offers support for the idea that plants may be quasi-sentient. What would this look like in practice? While we are still not at the point of reaching hard conclusions about the differences in sentience between animals and plants, given our account of gradualism, a *prima facie* response would be to say that when we move down the evolutionary tree from entities with more sophisticated sentience to entities with quasi-sentience, it is not a matter of categorical differences but rather of degree of sensations where the intensity and relevance of sensations are diminished, since “Many of the chemicals that control behaviour and emotions in humans and other animals are also synthesised or have analogues in plants: auxin for example is chemically very similar to neurotransmitters such as serotonin, dopamine and adrenaline” (Calvo & Lawrence, 2023, p. 188).

Finally, *A3: moral status is a matter of degree*. While there is continued disagreement over the necessary and sufficient conditions for moral status (see Clarke et al., 2021), for our purposes moral status is most generally about finding out which entities are sentient or have the capacity for sentience (Veit & Browning, 2023). More specifically the “moral status of an entity is grounded in the fact that it possesses a status property,” and we have overriding reasons to believe that sentience is the most fitting status property, since without sentience an entity would have no interests or welfare (Timmer, 2023). The *raison d’être* for moral status, then, is its grounding account.<sup>13</sup> There is a strong conceptual link between moral status and sentience, as sentience accommodates our beliefs about extending moral obligations beyond species-membership to entities with morally relevant interests like sentience “and why we ought to be, on pain of moral failure, concerned with the nature and quality of their morally relevant interests” (Terrill, 2021, p. 190). That moral status admits of degrees is consonant with *AI* under the *sliding-scale model* or the *scalar model* of moral status (DeGrazia, 2002, p. 34; Timmer, 2023). In other words, the degree of moral status is determined by the strength and complexity of the degree of sentience (DeGrazia, 2008), since “it is not at all inconceivable to have graded levels of [moral status] protection for different degrees of sentience” (Veit, 2023a, p. 95). So, the simpler the sentience, the lower the moral status (McMahan, 1996, p. 7). If the degree of sentience an entity has provides us with reasons to ensure that entity is treated commensurately with their degree of moral status, then an entity with quasi-sentience has some minimal morally relevant interests and confers that entity with a lower degree of moral status – i.e., partial moral status (Chan, 2021;

<sup>13</sup> Nevertheless, the idea that sentience grounds or is important for moral status is not uncontested (see Sachs, 2011 and Kammerer, 2022).

Terrill, 2022, p. 12). Any confusion about the link between quasi-sentience and moral status might be a *sensu stricto* objection if we were claiming that quasi-sentience is sufficient to confer full moral status, traditionally associated with the capacities of paradigmatic adult humans. But this is not the case. Sentience reflects interests, so if we move away from a complex and idiosyncratic understanding of interests from the paradigmatic adult human case to consider ‘sort-of’ cases of interests (that can still be minimally harmed), then this is why quasi-sentience is morally important enough to confer partial moral status.

## Moral and Policy Implications of Plant Quasi-Sentience and Partial Moral Status

As a reminder, we are trying to answer whether plants could be entities that can be (at least minimally) harmed. To reiterate our main assumptions, if gradualism about sentience is true and moral status is a matter of degree, quasi-sentience is very plausibly compatible with partial moral status. While “Those who accept that moral status comes in degrees have not developed fine-grained accounts of what each degree of status would involve,” we readily admit that we have only sketched out a coarse-grained account of both partial moral status and quasi-sentience (Jaworska & Tannenbaum, 2021). But a coarse-grained account is all we need to get to our main argument: both animals and possibly plants have moral status, but animals *prima facie* have more moral status than plants.

If plants may be quasi-sentient, per *A2* above, then plants may have partial moral status.<sup>14</sup> This means that plants may minimally matter morally, and moral agents may have some minimal moral obligations towards plants. And, if we gain confidence in the degree of sentience plants may have, the stronger confidence we may have in conferring the degree of moral status to plants (Veit, 2023a). More to the point, the link between plant quasi-sentience and plant partial moral status may be explained in the following way: for our purposes, quasi-sentience is the *explanan* to partial moral status’ *explanandum*. Like some of the arguments invoked with regards to insect sentience, if we assume that there is a non-negligible chance that plants may have quasi-sentience, then we have a *pro tanto* moral obligation to consider that assumption when  $\phi$ ing (Sebo and Schukraft, 2021). That plants may have quasi-sentience and partial moral status does not require us to completely get rid of our common-sense intuitions that plants have neither strong, sophisticated sentience nor full moral status. All we have really done, then, is make room for some moral protections even in the absence of sophisticated sentience and full moral status.<sup>15</sup> Table 1 illustrates a simple decision-matrix model that explains our situation.

<sup>14</sup> The obvious converse is that if plants have no sentience, then moral agents need not care about plant interests at all, which means that we may reasonably exclude plants from our moral status ontology. If the veracity of our conditional argument that plants possibly have quasi-sentience and partial moral status is verified with conclusive evidence, then new paradigms in the plant sciences, as well as ethics, should arise.

<sup>15</sup> Even if we continue to acknowledge that the probability of evidence of plant sentience is quite low (Birch, 2023), a low probability is sufficient for us to at least consider the plausibility of plant partial moral

**Table 1** Plant sentience and moral status

Degree of sentience and moral status	No sentience ∴ no moral status	Quasi-sentience ∴ partial moral status	Sophisticated sentience ∴ full moral status
Moral obligations towards plants?	No	Some, but outweighed by animal interests in most cases	Yes

One might object at this point that if  $A1$ – $A3$  are true, then there is a worry about indefinite refinement, e.g. quasi-quasi sentience versus quasi-but-reasonably-sophisticated sentience.<sup>16</sup> However, here we should simply recognize that many phenomena in nature are on a continuum without sharp category boundaries in between. Of course, that need not dissuade us from clarifying our concepts as much as possible since there are genuine reasons for concern here, namely the possibility of large numbers of unnecessary plant harms. Even if it is hard to know how to quantify, it is most reasonable to assign a non-trivial credence to a low degree of quasi-sentience and partial moral status to plants given such uncertainty, especially under some version of a confidence threshold, expected value principle, and/or the precautionary principle (Ladak, 2023). Of course, the non-trivial credence is contingent on how much epistemic weight is given to the body of evidence for plant quasi-sentience. Another challenge is whether quasi-sentience and partial moral status can actually solve any problems. To respond to this challenge, let us take a simple toy case, where a moral agent must choose to save either A or B, with A having quasi-sentience and B having no sentience whatsoever. In this case, quasi-sentience clearly helps us solve cases like these: the moral agent ought to save A *ceteris paribus*. Of course, the case of comparison between animals and plants is much more complicated since some animals have more sophisticated sentience, but quasi-sentience is nevertheless in principle helpful to begin carving out our moral calculus. Additionally, the gradualist view on sentience has the potential to solve problems as more and more refined demarcations are made than would have otherwise been made, especially in cases of possibly neglected moral patients. After all, one need only recognize the refined demarcations in sentience and moral status made in the animal kingdom, including cephalopod molluscs, decapod crustaceans, and insects (Birch et al., 2021; Mikhalevich & Powell, 2020).

We may now ask about the moral and policy implications of plant quasi-sentience and partial moral status. If plants have partial moral status, then it warrants slightly strengthening moral protections for plants. What could this look like in practice without being intractable? Like Milburn (2023), we agree that ethical veganism is still the best moral option between eating animals and plants *ceteris paribus*. However, a *prima facie* response is to say that minimal increases in moral status should minimally change our behaviors toward plants, prompting us to rethink not only our normative repertoire but also, for example, land development (e.g., deforestation),

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status. Additionally, while the literature around plant partial moral status remains sparse, it represents an open area of future research (see Terrill, 2021 for one account).

<sup>16</sup> Thanks to an anonymous reviewer for motivating this worry.

farming, flora conservation, plant-parenting conditions, and global food systems and diet – fruitarian or otherwise (Calvo & Segundo-Ortin, 2023; Kallhoff et al., 2018).<sup>17</sup>

However, the implications of plant partial moral status vary in terms of granularity. Suppose we weigh the value of an individual animal’s welfare against the welfare of an individual plant. For example, does the moral status of, say, your pet pig morally weigh less because plants now have moral status? In other words, does plant partial moral status trivialize the pig’s moral status? A less fine-grained implication is that the moral status of your pet pig here is not trivialized by granting moral status to plants, as moral status is not a zero-sum game (Douglas, 2013). When making comparative moral calculations, “the proposed benefits must correspondingly be higher” to your pet pig because of their sophisticated sentience and higher degree of moral status (Browning & Veit, 2022).<sup>18</sup>

There are several more fine-grained implications. First, a set of questions arise: (1) are some plants more sentient than other plants, and (2) are some plants in a certain developmental stage more sentient than in an earlier or later stage of development?<sup>19</sup> These are both important and necessary questions if we want to ensure robust accounts of both quasi-sentience and partial moral status. That said, we must call attention to the fact that the answers to (1) and (2) do not impinge on our thesis. In our taxonomy of the set of all animals and plants, we claim that it makes sense to confer  $x$ -degree of sentience with a concomitant  $y$ -degree of moral status. The resulting inter-comparative moral and policy implications between animals and plants is thus given weak lexical priority (at least in practice) compared to the intra-comparative moral and policy implications found in (1) and (2). A brief, moderate response to (1) and (2) that seems prudent would be to answer in the affirmative: just like animals, some plants may be more sentient than other plants and plants in certain developmental stages may be more sentient than in earlier or later stages. Still, we should be mindful of the universally acknowledged truth that the comparison of valenced experiences felt by different entities, as well as the amount and quality of valenced experiences, is incredibly difficult to measure. Additionally, there are an estimated 434,335 total number of described taxonomic plant species, with an estimated 369,000 total number of described taxonomic flowering plant species; as far as we can discern, given the vast diversity of plants, it could even be that some plants are not sentient whatsoever.<sup>20</sup> Perhaps analogous to possible differences between animals, there may be some small degree of quasi-sentient difference between land plants and water plants.

<sup>17</sup> Philosophers and activists have already asked whether and how environmental policy can accommodate legal status for plants (Stone, 2010). At this moment, there are already calls for action from the nonprofit Earthjustice to protect mature, old-growth trees from logging (<https://earthjustice.org/action/protect-our-oldest-forests>). Instead of thinking about policy protections as an *either/or* instance between either instrumental or intrinsic reasons, we may instead think about policy protections from a *both/and* perspective. For the future, we may start asking both what kind of legislation and industry changes could be enacted to better sustain the planet for instrumental reasons while also being mindful of the intrinsic possible partial moral status of plants.

<sup>18</sup> Moving forward, it may be worthwhile to think about *status quo* and anthropocentric biases that exist against both animals and plants.

<sup>19</sup> Thanks to an anonymous reviewer for prompting these questions.

<sup>20</sup> See the following for more information: <https://ourworldindata.org/how-many-species-are-there>.

Maybe “plant species capable of fast, surprising movements,” like some carnivorous plants, and given their evolutionary history, have a stronger degree of quasi-sentience than non-carnivorous plant species (Calvo & Lawrence, 2023, p. 95). This is all mere speculation, but hopefully we will determinately know in the future. Of course, the burden of proof shifts to the plant neurobiologists to garner strong evidence; an inferential solution is to distinguish underlying structures between plants where the evidence may come about from non-animal experiments designed specifically for plants (Calvo & Segundo-Ortin, 2023).

Second, how should we proceed with welfare-based policies directed at different kinds of entities with the same degree of sentience and moral status? For example, what if annelid worms or insects have the same degree of quasi-sentience and degree of partial moral status as plants? Third, how should moral agents  $\phi$  given unknown units of aggregate welfare comparison, especially since plants far outweigh animals in terms of biomass and number (Bar-On et al., 2018)? Until we accumulate more evidence about plant quasi-sentience and the biological basis of consciousness, we suggest assigning a very low value to the partial moral status of plants that would make them ‘lose’ out against animal interests even when we compare a lot of plants against a few animals, which is not to say that an entire forest of plants cannot ever have greater collective moral weight than one pig.<sup>21</sup> This approach would enable us to maintain the priority of animals, without the need to deny plants any moral status. As we put it in the title, it may be better to have a pig with low welfare that is still worth living than to have a plant with high welfare.

## Conclusion

To conclude, nothing we, nor Segundo-Ortin and Calvo (2023), have said settles the final question on the possibility of plant quasi-sentience and partial moral status, but it is at least a start to get this important debate started. Similar to recent discussions on insect sentience, consciousness researchers as well as ethicists have the difficult, ameliorative task of rethinking our concepts of sentience and moral status to allow for a gradualist picture. A gradualism of this sort may be hard to think about, as well as being unintuitive, but it is likely the only game in town to make progress on from endless debates about where we can draw clear lines in the sand between those entities that are sentient and morally matter, and those that are not.

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<sup>21</sup> Two points that require additional evidence include first determining the precise degree of plant-specific valenced states, and second determining, if plants do have said states, whether they have high harm thresholds, mechanisms to numb harms, or a different kind of harm experience altogether (Brooks Pribac, 2023; Milburn, 2023).

## Declarations

**Conflict of Interest** Ethan C.Terrill is presently employed at a global non-profit organization providing philanthropic advisory services.

**Consent to Publish** Not applicable, since this paper did not involve empirical research. We, the authors, however, agree to publication.

**Competing Interests** Walter Veit declares no competing interests.

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