

Tilling in Community Garden Plots

Before you till

Community gardeners must contact THPRD Community Gardens program staff for approval before any tilling. Most beds do not need tilling. Choose lower-disturbance alternatives whenever possible.

Why limit tilling?

- Repeated rototilling breaks stable soil aggregates. This leads to re-compaction, surface crusting after rain, and weaker structure over time.
- Disturbance reduces microbial biomass and breaks mycorrhizal networks that help plants access water and nutrients.
- Fine, bare soil erodes easily. Organic matter and nutrients are lost with runoff.
- Earthworms and other beneficial soil fauna decline in frequently tilled beds.

What the research shows, in brief:

- Conservation or no-till systems have higher total microbial biomass on average, with particularly strong gains in clayey and loamy topsoils.
- Intensive tillage increases compaction indicators and reduces aggregate stability. No-till generally maintains better infiltration and water-holding.
- Long-term tillage depletes soil organic carbon and total nitrogen. Conservation or no-till tends to rebuild both.

Make “no-till” your default

- Keep soil covered all year with organic mulches or living covers.
- Add compost on the surface and let soil life move nutrients downward.

If staff approves tilling, minimize disturbance

- **Depth:** keep cultivation shallow, about 2–5 cm (1–2 in), for light weed control or to incorporate a thin compost layer. Avoid deep rotary tillage beyond 15–20 cm (6–8 in).
- **Timing:** work soil only when it is moist like a wrung-out sponge. Tilling clay or loam when wet smears pores and creates clods. When overly dry, aggregates powder and later crust.
- **Passes:** make a single light pass. Repeated passes increase compaction.
- **Tools:** prefer a **broadfork** to loosen without inversion. Use sharp hoes or a stirrup hoe for shallow cultivation. Avoid mixing soil horizons.
- **Aftercare:** immediately re-cover the surface with mulch or a cover crop to protect aggregates, slow erosion, and feed soil biology.

Small rototillers in raised beds

- Mini cultivators still disrupt fungal hyphae and fine aggregates. If used, set shallow, use sparingly, and broadfork first. In confined beds, repeated equipment passes can compact soil over time.

Prefer these alternatives to tilling

- **Broadfork + mulch:** lift and aerate without inversion, then top with 2–5 cm compost and mulch.
- **Sheet mulching:** cardboard, compost, and mulch to smother weeds and build structure.
- **Cover crops:** oats and peas in cool seasons, crimson clover in spring, buckwheat in summer to protect the surface and feed microbes.
- **Compost topdressing:** 1–2 cm on the surface once or twice a year maintains fertility with minimal disturbance.

Quick FAQ

Is one deep till to “reset” a bed helpful?

Usually not. Any short-term looseness is often followed by faster re-compaction and loss of organic matter. If a layer is compacted, broadfork without inversion, add organic matter, and keep the surface covered.

How shallow is “shallow”?

For routine cultivation and compost incorporation, about 2–5 cm (1–2 in). Reserve deeper mechanical loosening for rehabilitation only and avoid inversion.

Will nutrients move without mixing?

Yes. Surface compost and mulches, together with roots, worms, and microbes, move nutrients into the root zone while protecting structure and soil carbon.

References

- Chen, H., Li, X., Hu, F., & Shi, W. (2020). Global meta-analyses show that conservation tillage practices promote soil fungal and bacterial biomass. *Agriculture, Ecosystems & Environment*, 293, 106841. <https://doi.org/10.1016/j.agee.2020.106841>
- Nunes, M. R., van Es, H. M., Schindelbeck, R., Ristow, A. J., & Ryan, M. (2020). Tillage intensity effects on soil structure indicators. *Sustainability*, 12(5), 2071. <https://doi.org/10.3390/su12052071>
- Blanco-Canqui, H., & Ruis, S. (2018). No-tillage and the soil physical environment. *Geoderma*, 326, 164–200. <https://doi.org/10.1016/j.geoderma.2018.03.011>
- Chan, K. Y. (2001). An overview of tillage impacts on earthworm abundance and diversity. *Soil & Tillage Research*, 57(4), 179–191. [https://doi.org/10.1016/S0167-1987\(00\)00173-2](https://doi.org/10.1016/S0167-1987(00)00173-2)

- Tatewaki, Y., Sato, M., & Taniguchi, T. (2023). Tillage effects on arbuscular mycorrhizal fungi and maize P uptake and yield. *Applied Microbiology*, 3(2), 358–374.
<https://doi.org/10.3390/applmicrobiol3020025>
- Zhao, H., Xu, J., Xu, C., & Banning, N. (2024). Soil health and carbon storage in community gardens in the Perth metropolitan area. *Soil Use and Management*, 40(1), 135–148.
<https://doi.org/10.1111/sum.13033>