

THE LONG-TERM ROLE OF ORGANIC AMENDMENTS IN BUILDING SOIL NUTRIENT FERTILITY: A META-ANALYSIS AND REVIEW

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An exhaustive meta-analysis of 132 long-term (≥ 10 yr) studies worldwide was carried out to determine the effects of the use of organic amendments (OA) and OA + inorganic fertiliser (IF) on soil nutrient fertility.

The responses of (i) crop yield [over the whole duration of the period ($yield_m$) and at the end of the experiment ($yield_r$)], (ii) soil organic carbon (OC), (iii) size of microbial biomass, and (iv) Olsen phosphorus (P) to OA and OA + IF compared with IF only (*standard control*) and no fertilisation (*nil control*) were investigated.

The overall effect of OA alone on yield was significant when compared with the *nil control*, but not when compared with the *standard control*. Only when OA and IF were added to soils that met specific conditions (low initial fertility, sandy texture, near-neutral pH values, under tropical climate) they rendered a significantly greater yield than the corresponding *standard controls*.

The continuous application of manure caused greater relative and absolute gains in soil OC than straw + IF but did not produce significant greater yields while causing a considerable increase in Olsen P over time. The use of OA and OA + IF increased the resilience of agronomic systems over that of IF alone, as inferred from the smaller coefficient of variation of crop yield over time.

We conclude that while the use of OA along with IF provides some additional benefits on yields as compared with IF application alone (especially under the above-mentioned conditions), the selection of the OA type and application rate should be carefully considered in order to maximise the nutrient use efficiency and minimise any undesirable effects to the environment.

Editor's Note: An extended manuscript has not been submitted for this presentation.