

Scientific Farming Advocated by Thiruvalluvar

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Abstract

The research tries to document the scientific aspects of traditional agricultural knowledge as expressed in Thirukkural, the Tamil scripture by Thiruvalluvar, the eighth-century Tamil poet, who is associated with the Thirukural. Although there is a distinct difference between organic and inorganic farming in the modern era, ancient tamil literature revealed that the farming methods of natural farming are of scientific nature before the chemical farming era. The paper looks into the compatibility of Thiruvalluvar's slokas on ploughing and manuring with the current soil science and sustainable agriculture concepts. A conceptual analysis is used, based on soil physical and biological properties (bulk density and microbial activity), and hypotheses are proposed that contrast traditional knowledge and modern agronomic science. The importance of using correct ploughing which will break the clods into $\frac{1}{4}$ of their size is emphasized in verse 1037 of the Thirukkural indirectly stating optimal bulk density around 1g/cm^3 which will contribute to better aeration, better water infiltration and better root development. Likewise, verse 1044 emphasises the need to manure and protect the crops and not just plough and irrigate, reflecting the current trend of promotion of soil biological health, zero tillage, and IPM. The results clearly support that the principles of soil management and crop protection taught by Thiruvalluvar are scientifically valid. The paper is able to reject the null hypothesis and thus, it concludes that the agricultural couplets written in Thirukkural are in accordance with the scientific farming in the present times. Furthermore, the study emphasizes the synergy between traditional ecological knowledge and modern sustainability frameworks, drawing implications for the creation of sustainable and resilient agriculture practices by the classical Tamil literature.

Keywords: Soil management, Irrigation, Agriculture, Thirukkural.

Introduction

Natural and organic farming is a topic of the day. The process of farming was natural back then for many years. The distinction between organic and inorganic farming started by the use of chemical fertilizers and pesticides in the 1960s (ICAR, 2022). Some think that only inorganic farming is scientific and that natural/organic farming is only a traditional practice. Traditional systems based on natural principles, however, are also scientific as revealed by several ancient manuscripts (Ponnusamy & Rajasekaran, 2019). It is the case with Thirukkural, a text written by Thiruvalluvar with a chapter named “Uzhavu” (Agriculture) wherein many scientific aspects of farming are talked about. This paper focuses on two of those principles—ploughing and manuring—and explores their connection with modern soil science.

Methodology

There are several aspects of soil management that impact the physical, chemical and biological characteristics of the soil (Brady & Weil, 2017). Bulk density (BD) is the mass of soil per unit volume (including pore volume) and one of the most important physical properties. Typically, BD ranges from 1.0 to 1.6 g/cm³ (Wikipedia, 2024). A higher BD means that soil is more compact, has less pore space, does not allow air or water to penetrate, roots to grow, and eventually less crop will be produced. For example, 100 g of sand may occupy 67 cm³, giving a BD of 1.5 g/cm³, while loamy soil occupies 77 cm³ (BD = 1.3 g/cm³), and peat soil rich in organic matter occupies 100 cm³ (BD = 1.0 g/cm³). So, a decrease in compactness results in a decrease in BD and increase in soil quality. Soil biological properties are also as important as physical properties (FAO 2021). Soil exists as a living system with insects, microorganisms and organic matter in many layers. Physical and chemical factors are well studied and biological factors are lesser studied. The properties are linked together, e.g. ploughing affects micro-biological population. Harmful pests will be exposed during the summer ploughing, while too much or deep tillage will kill beneficial organisms and decrease the amount of organic carbon (MoAFW, 2023). Therefore, zero tillage and conservation agriculture (C.A) in which the upper layer of soil is disturbed to a minimum extent are becoming more popular worldwide. For enhanced microbial community, soil fertility and sustainability, manure application is required (Ghosh, Das, & Saha, 2018). In the same way, irrigation is essential to plant growth and plant protection is even more important. Irrigation is not enough to produce yields unless pest and disease management is also provided. The principles outlined above are also echoed in modern agriculture (Lal, 2020), and are present in Thirukkural.

For this purpose the following hypotheses are used in the study:

H₀: Soil properties, soil management principles that correspond to the present scientific agricultural practices are not mentioned in the Thirukkural.

Alternative Hypothesis (H_a): Verses on ploughing and manuring in the Thirukkural are in accordance with the scientific farming principle.

Results and Discussion

In the chapter called Uzhavu, Thirukkural has ten couplets authored by Thiruvalluvar. In that chapter the seventh couplet (Verse 1037) says:

தொடிப்புழுதி க.:சா உணக்கின் பிடித்தெருவும்

வேண்டாது சாலப் படும்.

Thodippuzhudhi Kaqsaa Unakkin Pidiththeruvum

Vendaadhu Saaalap Padum (Transliteration)

If the land is ploughed and dried to one fourth, it will produce ample crops without the addition of even a handful of manure (Thirukkural.net, 2024). In this verse the preparation of the soil is considered to be a primary factor and the use of manure a secondary one. In this place, “Kaqsu” (க.:சா) refers to 1 quarter of a unit. This means that ploughing that is effective will break down the soil clods to 1/4 the original size, thus leaving the soil soft and aerated, permitting a better percolation of water and air and roots to grow. This matches the scientific definition of bulk density, referred to above (Brady & Weil, 2017; Wikipedia, 2024). As particle size decreases from 0.18 mm (sand) to 0.045 mm (peat) BD decreases from 1.5 to approximately 1.0 g/cm³, hence enhancing the structure and productivity of the soil. So the 1037 verse of Thirukkural aptly states the principles of modern soil sciences for maintaining soil physical properties.

Thiruvalluvar also talks about the biological side of soil in the eight couplet (1044) of the same chapter, by emphasizing manuring:

ஏரினும் நன்றால் எருவிடுதல் கட்டபின்

நீரினும் நன்றதன் காப்பு.

Erinum Nandraal Rruvidudhal Kattapin

Neerinum Nanradhan Kaappu (Transliteration)

Translation: “Manuring is better than ploughing; After the weeding, protection is better than watering” (Thirukkural.net, 2024). This verse indicates that manuring is more important than ploughing. Indirectly suggests that good manuring promotes microbial activity and health of soil which is central in modern organic and zero tillage farming (ICAR, 2022; Ponnusamy & Rajasekaran, 2019). If irrigation is not possible, the rainfall may take its place, but without the protection of the plants, all efforts are lost, Thiruvalluvar adds. This principle is similar to the integrated pest management that is highlighted in sustainable agriculture (FAO, 2021; MoAFW, 2023). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted: Thiruvalluvar’s plough and manuring verses have great similarity with the modern scientific farming. Apparent conflicts in verses, e.g. saying to plough in one, and manure in another, are complementary views, not contradictions. In many instances, Thiruvalluvar puts forward the motivational and the philosophical perspectives, as in other couplets on fate (Oozhir Peruvali and Oozhaiyum Uppakkam), (Subramanian, 2016) Similarly, his agricultural instructions imply, “If it can be done, plough it well, if not, manure it so as to improve the soil microbes; if it is not possible, protect the crop diligently.” Hence, Thirukkural’s scientific agriculture can be viewed as a blending of physical, biological and ecological principles which are relevant even today (Lal, 2020; Ghosh et al., 2018).

Conclusion

The agricultural verses of Thiruvalluvar are full of scientific knowledge about the physical, biological and sustainable management of soil. His principles of ploughing, manuring and crop protection are similar to the principles of bulk density optimization, zero tillage, soil biodiversity and integrated pest management, which are now accepted concepts. These results confirm that traditional knowledge such as Thirukkural is a valuable scientific knowledge system which contains valuable information to implement sustainable agriculture systems in the contemporary world..

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