

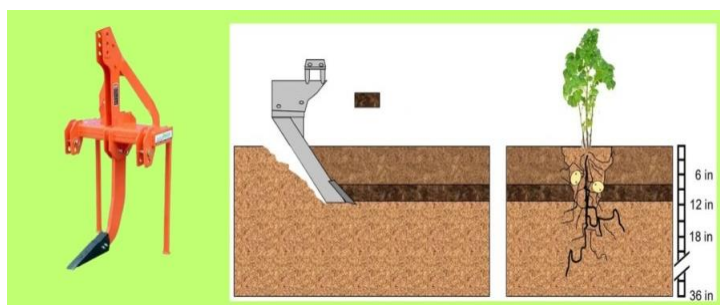
# Causes of Soil Compaction and Hardpan Formation and Its Optimal Solution – Subsoiling

Priyanka Rajkumar Khole

Subject Matter Specialist, Sanskriti Samvardhan Mandal's Krishi Vigyan Kendra Sagroli, Nanded

\*Corresponding Author:

Changes in the environment, along with various farming practices such as intensive chemical fertilization, excessive rainfall, drought, excessive irrigation, traditional farming methods, and the adverse effects of mechanization, have all led to significant consequences on soil health. The continuous use of heavy and cumbersome machinery for agricultural operations has resulted in compaction, crusting, and the formation of hardpan on the soil surface. Subsoiling emerges as an optimal solution to address these issues.



## What is Subsoiling?

Subsoiling refers to the process of breaking up compacted layers formed beneath the surface of the soil. When the upper layers of the soil become compacted due to various factors, the soil structure deteriorates, and the soil becomes less porous. Subsoiling involves breaking through these compacted layers to improve soil aeration and drainage. The depth of subsoiling typically ranges from 2 to 2.5 feet, depending on the type of soil.

## Subsoiled Field

By employing subsoiling techniques, farmers can mitigate soil compaction, crusting, and hardpan formation, thereby enhancing soil health and promoting better crop growth. It serves as a proactive measure to counteract the adverse effects of modern agricultural practices and environmental changes, ensuring the sustainability of agricultural land for future generations.



## How to Perform Subsoiling?

For subsoiling, a machine called a subsoiler is available, which is operated by a tractor. This machine is known as a subsoiler. It is designed to break up compacted layers and improve soil aeration and structure by penetrating the hard layers of soil and loosening them.

## Benefits of Subsoiling

- **Breaks Compacted Layers:** Subsoiling breaks through compacted layers formed in the soil, allowing for better root penetration and water infiltration.



- **Improves Soil and Water Conservation:** Through subsoiling, soil and water conservation are enhanced, ensuring better retention and utilization of moisture.

- **Facilitates Nutrient Absorption:**

Subsoiling makes it easier for crops to absorb essential nutrients from the soil, resulting in improved crop health and yield.

- **Reduces Waterlogging:** By improving drainage and aeration, subsoiling helps prevent waterlogging, reducing the risk of crop damage and disease.
- **Increases Water Holding Capacity:** Subsoiling increases the soil's ability to hold water,

ensuring a steady supply of moisture to crops during dry spells.

- **Enhances Crop Growth:** With improved soil structure and nutrient availability, crops experience better growth and productivity.
- **Mitigates Rainfall Risks:** Subsoiling reduces the risk of crop damage during heavy rainfall by preventing water stagnation and runoff.
- **Promotes Efficient Water Management:** By preventing water runoff and ensuring proper water distribution, subsoiling contributes to efficient water management practices.
- **Cost and Time Savings:** Subsoiling, typically done once every two to three years, results in long-term benefits for soil health and productivity, leading to savings in both costs and time.

subsoiling offers a range of benefits that contribute to improved soil health, enhanced crop yield, and more efficient water management practices, ultimately ensuring sustainable agricultural practices for the future.

**Types of Subsoilers:** The classification of subsoilers is based on the number and size of their shanks or tines, as well as the configuration provided by the manufacturer. Here are some examples:

1. **Single-Shank Subsoiler:** These subsoilers have a single shank or tine and are suitable for

smaller-scale operations or areas with minimal soil compaction.

2. **Multi-Shank Subsoiler:** Multi-shank subsoilers feature multiple shanks or tines arranged in rows, allowing for more extensive coverage and deeper penetration into the soil.

These are just a few examples of the various types of subsoilers available, each designed to suit different soil types, conditions, and farming practices.

### Operating Subsoilers

Subsoilers are operated by pulling them through the subsoil layer beneath the surface. They are used to work within a depth range, from light and loamy soils up to 1.5 feet deep, to heavy clay soils up to 2 to 2.5 feet deep. The depth of penetration and the spacing between the subsoiler shanks can be adjusted according to the requirements of the soil.

### Optimal Timing for Subsoiling

Subsoiling should ideally be carried out once every two to three years, preferably between the months of November to May, to achieve favorable results.

### Estimated Cost of Subsoilers

In the market, various types of subsoilers are available, ranging in price from around ten thousand to two lakh rupees or more. The choice of subsoiler depends on factors such as soil type, crop type, and preferred method of cultivation.

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