



No. 1

MINIMAL TILLAGE

Minimal tillage is one of the primary principles applied while pursuing Conservation Agriculture. By not tilling land, the farmer is able to generate savings on account of time normally devoted to land preparation, and costs on account of savings from tractor, fuel and labour hire. However, this practice needs to be understood in its technical perspective, ensuring its deployment not just as a stand alone solution, but accompanied by practices of keeping soil covered and adopting crop rotation.

- Tilling of land is synonymous with farming activity and has always reflected itself in symbols and associations wherever mention of agriculture is made.
- The main objective of the age old practice of ploughing and tilling land is to facilitate sowing operations for the next crop by loosening the soil and removing crop residue of previous crop that obstructs proper seed placement. Another objective of ploughing and keeping the land fallow for sometime is to recuperate soil fertility depleted by the previous crop. However these benefits are not without a cost.
- Scientific evidence over the years has proven that repeated tillage over the years in fact decreases soil organic matter, that is vital for soil health and crop growth. This is evident in the challenges facing us, given the accepted decline in soil organic matter, soil fertility, and overall productivity. Most of these conditions have been brought upon as a result of deterioration of physical, chemical and biological properties of soil.
- The practice of minimum tillage is aimed at minimising disturbance of soil along with presence of residue on soil surface. As against the conventional practice of ploughing the entire field, only a planting line or a planting hole for sowing the seed is opened up mechanically. By leaving the land less disturbed, the soil is able to retain more moisture and nutrients, as compared to conventionally tilled land.



Crop sown in untilled land

Photo: CIMMYT

- Minimal tillage is most effective when combined with the practice of keeping soil covered, that helps increase soil organic matter. This involves applying residue of previous crops on the soil surface or growing a cover crop thus helping in sequestering carbon; thereby reducing greenhouse gas emissions. The residue also protects the soil from direct impact of rainfall, prevents soil erosion and improves infiltration. It also helps in moderating soil temperature by shielding it from the sun and thereby improving the biological activity.
- Minimal tillage offers various benefits, natural and economical since it reduces the number of times that the land is cultivated. Producers are able to directly plant their crop into the previous crops residue that in turn provides a wide range of benefits. Most farmers practicing it have benefited from early sowing due to time saved, helping them improve upon the window of opportunity for timely harvesting.
- This practice forms part of an integrated approach termed Conservation Agriculture that advocates minimum tillage and hence minimal soil disturbance. The practice of minimal tillage is also known by other terms such as reduced tillage, direct drilling, conservation tillage, no-tillage and zero-tillage.

APPLICATION

Minimal Tillage needs use of equipment for seeding in untilled land, and some important ones are:

Zero Till Seed-cum-Fertilizer Drill: The zero till drill is a useful machinery for farmers. It helps seed the crop directly into non-tilled field just after the harvest of the previous crop with least disturbance to soil.



Happy Seeder: Burning of rice stubble damages the environment and is widely practised in India due to lack of suitable machinery to directly seed wheat into

“combine-harvested” rice residues. The Happy Seeder is a useful device that can seed the following crop in untilled and residue covered fields. It cuts and spreads the stubble and loose straw, and sows wheat while retaining rice residue as surface mulch.



The following equipment help meet needs of minimal tillage in the African region and can be adapted for application in Indian field conditions for smallholder farmers.

Magoye Ripper: The Magoye Ripper is ideal for making planting lines. The animal-drawn Magoye ripper works at a depth of about 10-15 cm. After making the rip line, seeds and fertilizers are placed manually in the furrow and covered. The ripped lines also increase infiltration of water. The benefit is that the ripper uses less energy and labour than the plough and facilitates weed-free seedbed and timely planting. The Magoye Ripper has the advantage of making parallel lines of even depth



Photo: Patrick Wall

allowing even for germination. It can also facilitate early planting, and be used for weeding, making ridges and aerating the soil.

Hoe: This equipment facilitates manual seeding of crops into residues. Small holes are dug manually using a hoe in a way that the labour is distributed over a longer period and the



crop can be planted with first effective rains. Such an arrangement leaves soil undisturbed, helps capture water runoff, and lends benefit from precise fertiliser placement.



Photo: Christian Thierfelder

Job Planter: The job planter used in CA is a very popular equipment for small holder farms. It is manual equipment with two points that are pushed into the moist soil through the mulch, and opened to release the seed and fertilizer. It is quicker than a hoe, and seed & fertilizer can be placed with more precision.

BENEFITS

Most benefits accruing from minimal tillage can be experienced only when the other two conditionalities of CA are applied, viz. crop cover and crop rotation.

- Since minimum tillage is a precise way of planting, it helps focus water and nutrients where needed.
- Seed and compost can be placed with greater precision. The nutrients applied to the previous crop gets used up through the residue for the following crop.
- A weed free field can eventually be achieved if soil is not disturbed between seeding lines or holes and weeding is done thoroughly during initial years.
- When applied with crop residue cover, minimum tillage facilitates moisture conservation and moderates soil temperature.
- It also plays an important role in reducing erosion, improving the quality of surface water and enhancing soil biodiversity
- Minimum tillage can improve water holding capacity of soil by decreasing evaporation and water loss
- Brings about savings in fuel and labour costs
- Most importantly it saves on costs and time, ensuring early planting and timely harvesting.

EQUIPMENT SUPPLIERS

- Bharat Industries
- Bir Singh and Sons
- Dashmesh Mechanical Works
- Dharti Agro Engineering
- Malaiya Agro Engineering Private Limited
- Modern Agro Engineering Works
- National Agro Industries
- Standard Agri. Engg. Co.
- Vishavkarma Agro Industries
- Zandu Steel Works

Details of above manufacturers as well as other FactSheets and information booklets can be accessed from our website www.conserveagri.org/links.htm. Please feel free to write to us at info@conserveagri.org should you need to know more about Conservation Agriculture.