Tillage implements are broadly categorized into several groups depending on the purpose for which they are use:

**Primary Tillage implements**

Implements used for opening and loosening of the soil are known as ploughs. Ploughs are used for primary tillage. Ploughs are of three types: wooden ploughs, iron or inversion ploughs and special purpose ploughs.

**Wooden plough or Indigenous plough**

Indigenous plough is an implement which is made of wood with an iron share point. It consists of body, shaft pole, share and handle. It is drawn with bullocks. It cuts a V shaped furrow and opens the soil but there is no inversion. Ploughing operation is also not perfect because some unploughed strip is always left between furrows. This is reduced by cross ploughing, but even then small squares remain unploughed.

**Soil Turning Ploughs**

Soil turning ploughs are made of iron and drawn by a pair of bullocks or two depending on the type of soil. These are also drawn by tractors.

**Mouldboard Plough**

The parts of mouldboard plough are frog or body, mouldboard or wing, share, landside, connecting, rod, bracket and handle. This type of plough leaves no unploughed land as the
furrow slices are cut clean and inverted to one side resulting in better pulverisation. The animal drawn mouldboard plough is small, ploughs to a depth of 15 cm, while two mouldboard ploughs which are bigger in size are attached to the tractor and ploughed to a depth of 25 to 30 cm. Mouldboard ploughs are used where soil inversion is necessary. Victory plough is an animal drawn mouldboard plough with a short shaft.

**Disc Plough**

The disc plough bears little resemblance to the common mouldboardplough. A large, revolving, concave steel disc replaces the share and the mouldboard. The disc turns the furrow slice to one side with a scooping action. The usual size of the disc is 60 cm in diameter and this turns a 35 to 30 cm furrow slice. The disc plough is more suitable for land in which there is much fibrous growth of weeds as the disc cuts and incorporates the weeds. The disc plough works well in soils free from stones. No harrowing is necessary to break the clods of the upturned soil as in a mouldboard plough.

**Turn-wrest or Reversible or One-way Plough**

The plough bottom in this plough is hinged to the beam such that the mouldboard and the share can be reversed to the left or to the right side of the beam. This adjustment saves the trouble of turning the plough in hilly tracts, but yet facilitates inversion of the furrow slice to one side only.

**SPECIAL PLOUGHS**

**Subsoil Plough:**

Subsoil plough is designed to break up hard layers or pans without bringing them to the surface. The body of the subsoil plough is wedge shaped and narrow while the share is wide so as to shatter the hard pan and making only a slot on the top layers.

**Chisel Plough:**

Chisel plough is used for breaking hard pans and for deep ploughing (60-70 cm) with less disturbance to the top layers. Its body is thin with replaceable cutting edge so as to have minimum disturbance to the top layers. It contains a replaceable share to shatter the lower layers.
Ridge Plough:

Ridge plough has two mould boards, one for turning the soil to the right and another to the left. The share is common for both the mould boards i.e. double winged. These mould boards are mounted on a common body. The, ridge plough is used to split the field into ridges and furrows and for earthing up of crops. Ridge ploughs are used to make broad bed and furrows by attaching two ridge ploughs on a frame at 150em spacing between them.
Rotary Plough or Rotary Hoes:

Rotary plough cuts the soil and pulverizes it. The cutting of soil is done by either blades or tynes. The blade types are widely used. The depth of cut is up to 12 to 15 cm. It is suitable for light soils.

Basin Lister:

Basin lister is a heavy implement with one or two mouldboards or shovels. These shovels are mounted on a special type of frame on which they act alternately. This implement is used to form listed furrows (broken furrows with small dams and basins) to prevent free runoff of rainfall and blowing off the soil in low rainfall areas.

Secondary Tillage Implements

Different types of implements like cultivators, harrows, planks and rollers are used for secondary tillage.

Tractor Drawn Cultivator:

Cultivator is an implement used for finer operations like breaking clods and working the soil to a fine tilth in the preparation of seedbed. Cultivator is also known as tiller or tooth harrow. It is used to further loosen the previously ploughed land before sowing. It is also used to destroy weeds that germinate after ploughing. Cultivator has two rows of tynes attached to its frame in staggered form. The main object of providing two rows and staggering the position of tynes is to provide clearance between tynes so that clods and plant residues can freely pass through without blocking. Provision is also made in the frame by drilling holes so that tynes can be set close or apart as desired. The number of tynes ranges from 7 to 13. The shares of the tynes can be replaced when they are worn out.
**Sweep Cultivator**

In stubble-mulch farming, it is difficult to prepare the land with ordinary implements due to clogging. Sweep cultivator is the implements useful under this condition. It consists of large inverted V shaped blades attached to a cultivator frame. These blades run parallel to soil surface at a depth of 10 to 15 cm. They are arranged in two rows and staggered. Sweep cultivator is used to cut up to 12 to 15 cm depth of soil during first operation after harvest and shallower during subsequent operations. It is worked frequently to control weeds. It can also be used for harvesting groundnut.

**Harrrows**

Harrrows are used for shallow cultivation in operations such as preparation of seedbed, covering seeds and destroying weed seedlings. Harrrows are of two types: disc harrow and blade harrow.

**Disc Harrow**

The disc harrow consists of a number of concave discs of 45 to 55 cm in diameter. These discs are smaller in size than disc plough, but more number of discs are arranged on a frame. These discs are fitted 15 cm apart on axles. Two sets of discs are mounted on two axles. All the discs revolve together with axles. The discs cut through the soil and effectively pulverise the clods.

**Blade Harrow**

Blade harrows are used for different purposes like removal of weeds and stubbles, crushing of clods working of soil to shallow depth, covering the seeds, intercultivation and harvesting of
groundnut etc. The blade harrows useful for intercultivation are discussed later. Blade harrows are two types viz. indigenous and improved.

**Indigenous Blade Harrows**

The general design of an indigenous blade harrow which is known as *guntaka* consists of a beam to which two pegs are attached at the ends. A blade is attached to these two pegs. Two shaft poles and a handle are the other parts of *guntaka*. Depending on the beam length and weight, they are known by different names and used for different purposes.

**Plank and Roller**

Plank is a very simple implement and consists of a heavy wooden beam of 2 m in length. In addition, shafts and handle are fixed to the beams. When it is worked most of the clods are crushed due to its weight. It also helps in micro levelling and slight compaction necessary after sowing. Rollers are used mainly to crush the hard clods and to compact the soil in seed rows.

**Implements for Layout of seedbed**

- **Country plough**
- **Ridge plough**
- **Bund former**

Country plough and ridge plough are used for laying out the field into ridges and furrows or to layout irrigation channels.

Ridge ploughs, when attached to a frame can be used for making broad-bed furrows.

Bunds for irrigation in the garden lands are made usually by manual labour using spades. Bunds are also formed across the contours in the low rainfall regions to conserve soil moisture. The bund farmer is designed to form these bunds replacing manual labour. This implement consists of a pair of iron mould boards fixed in opposite direction facing each other with the front end opening outwards and rear and closing in to form bunds.
Marker is used to mark intercepts for transplanting seedlings by square planting method. It consists of a beam to which 3 or 4 wooden tyres are fixed, the spacing of which depends on the spacing the crop. When it is run in two directions, very shallow furrow markings are formed in two directions. Seedlings are transplanted at the intercepts.

**Implements for sowing**

**Plough**

The seeds are dropped by hand in the furrow formed by the country plough. The seeds fall at uneven depths due to falling at random in furrow slice. To avoid this problem *Akkadi* is used. *Akkadi* is a hollow bamboo tube which is sharpened at one end and with wide hopper at another end. It is tied to country plough with the help of a rope and seeds dropped in the *akkadi*’s hopper. Seeds pass through the tube and fall in the furrow opened by the plough.

**Seed Drill**

Seed drill consists of a wooden beam to which 3 to 6 tynes are fixed. These tynes open the furrows into which the seeds are dropped. Holes are made into these tynes and into these holes, the bottom ends of bamboo or metal seed tubes are fitted. These seed tubes are connected at the top to a wooden seed receptacle called hopper. The seeds are fed at a uniform rate 'into this hopper by skilled labour walking behind the seed drill.
**Ferti-cum-Seed Drill**

Fertilisers are placed at a depth of 5 cm and 5 cm away from seed rows for effective utilisation of fertilisers. Both operations *viz.* drilling seeds and fertilizers are done simultaneously by ferti-cum-seed drill. It is similar to seed drill, but with extra tynes and hopper for drilling fertilizers.

**Mechanical Seed Drill**

The seed drill consists of a seed drum with holes in the bottom plate corresponding to the number of seed tubes for passing the seed into the seed tubes. A rotating disc has holes in a circular path and it is kept over a bottom plate. When the holes of rotating disc and bottom plate coincide, seed falls into the tube on its way into the soil. The distance between two holes in rotating disc is proportional to the inter-row spacing of crop. For sowing seeds of different sizes, rotating discs with different sized holes are used. There is provision for altering the distance between the rows by changing distance between the tynes. Inter-row spacing can be changed by using rotating discs with more space between the holes. Seed drills with different mechanisms for automatic drilling of seed are also available.

**Implements for intercultivation**

- Wooden plough
- Small blade harrow
- Weeders – Rotary weeders

**Country plough and ridge ploughs** are used for earthing sugarcane, potato etc. Country plough is run to a shallow depth to control weeds in widely spaced crops and fruit trees.

**Small sized blade harrows** are widely used for intercultivation. Several of them are designed by local artisans to suit special purposes and are given local names. These are simple in design, easy to make, cheap and serve the purpose excellently.

Intercultivation in close growing crops is done with *danthi* and each *danthi* covers one row only. A number of *danthis* are attached to a yoke for covering more area. The length of the blade of *pilla guntaka* ranges from 30 to 45cm. Depending on the inter-row spacing of the crop, the blade length is 10cm less than the inter-row spacing of the crop.

**Tobacco blade harrow** has longer blade than its beam so as to scrape the weeds on the soil without damaging the brittle petioles of tobacco.

**Star weeder** is a small implement pushed by manual labour. It consists of a long wooden or iron vertical rod with a small horizontal rod for holding the implement. To the other end, two star like wheels and a small blade of 10 cm are attached. The pointed teeth of rotating wheels loosen the
soil and help in easy mobility of the implement while the blade helps in cutting the weeds. It is useful to control small weeds in close growing crops like groundnut, foxtail millet etc.