

PROPER SOIL TILLAGE FOR SOWING



General recommendations

- A deadline for fulfilling the tasks, required equipment and tools have to be foreseen for every planned crop or their group;
 - Soil tillage has to be coordinated with crop rotation, fertilisation, sowing and plant protection;
 - A farmer should choose technologies that would speed up soil tillage before sowing. This aim is achieved in the easiest way with help of the aggregates that prepare the soil for sowing and perform sowing in one ride;
 - Winter crops have to be sown on the field that was ploughed late summer or early autumn, if there is a lot of organic matter in the soil;
 - If there are no possibilities to grow profit-generating crops (absent market, high costs), it is better to leave the land uncultivated or to sow perennial grasses.

Water protection in even and wavy fields

- When a field is larger than 12 ha, concentrated waterways should be sown to perennial grasses and not cultivated.
 - Pre-sowing soil tillage should be performed at the depth that is optimal for plant germination and growth (3-8 cm depending on crop type);
 - When autumn ploughing is performed well, the soil can be prepared for sowing by a medium heavy harrow (at 3-5 cm depth). When the soil is ploughed worse, grown pulpy during winter, there is a need for deeper and more intensive pre-sowing soil tillage by a cultivator (at 6-8 cm depth), aggregated by a harrow (at 4-5 cm depth). A combined seedbed preparation aggregate (germinator) suits very well for seedbed preparation (Fig. 1);

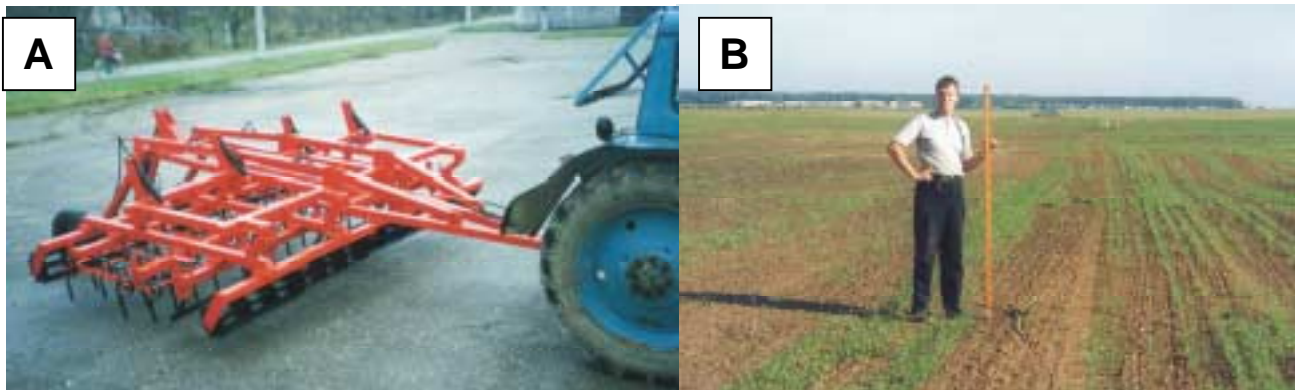


Fig. 1. A – cultivator-germinator; B - Maize sprouted better when a germinator was used (on the right of the meter) than a cultivator (on the left).

- If stubble was not cleaned in autumn, but was ploughed and sprayed by herbicides (of glyphos group), it has to be cultivated 2-3 times in spring by a cultivator aggregated by a medium heavy harrow. If it was ploughed well in autumn, it is enough to cultivate and harrow in spring 1-2 times;
 - Ploughing should be performed at the same depth and evenly. The first ride of plough usually makes a hillock and the last ride - wide and deep furrows. Next time the first ride should be done in the place of the last ride in order to reduce hillock. Equipment for soil levelling is

common but it is not sufficiently effective, it ruins soil structure, makes too thin soil humus layer in places of higher relief and too thick in places of lower relief. It is perspective to use a reversible plough (Fig. 2);

- Cultivated field soil should have enough organic matter, plant available nutrients; there should be no vegetative weeds. In enough improved soils it is possible to minimize soil tillage gradually and to reduce expenditure of labour and nutrient leaching.



Fig. 2. Ploughing is even on the field, where a reversible plough was used.

Prevention of soil compaction

- It is not good to cultivate soaked, wet soil. In spring the soil can be cultivated when there is optimal soil moisture (grasped in a

Yield reduction (%) due to soil compaction in dependence of soil moisture, clay particles (%), load size, working width and tire pressure.

Load size tonnes	Working width M	Pressure bar	Percent of clay particles at various soil moisture conditions					
			Wet	Normal		Dry		
			40	20	40	20	40	20
3	2	3,0	9,6	3,3	5,4	1,9	3,6	1,7
		1,5	8,3	2,9	4,7	1,7	3,1	1,6
5	3	3,0	9,9	3,4	5,6	2	3,0	1,4
		1,5	8,4	3	4,7	1,7	2,6	1,3
10	6	1,5	6,7	2,3	3,9	1,4	2,1	1
		0,8	5,3	1,9	3	1	1,7	0,9

*Note: Bar \approx 1 atmosphere

Prevention of soil erosion

The highest risk of soil erosion is in hilly areas. Hilly fields have to be ploughed at a normal depth – 20 cm. Instead of autumn ploughing by a mouldboard plough in hilly lands, it is recommended to loosen the soil by a heavy chisel cultivator at 20-22 cm depth 2-3 weeks after application of herbicides on the stubble.

If the stubble was sprayed by pesticides after harvesting, the soil can be left uncultivated in autumn for three years in turn. During cultivation of the slopes ploughed in autumn it is expedient to aggregate the cultivator by a medium-heavy harrow.

Depressions can be tilled and sown up only when they dry enough or they should be sown to perennial grasses (especially if the soil is peat) and left uncultivated.

palm soil crumbles when thrown). In autumn (before frost) one can plough wetter soil while the soil does not become soft;

- One should not use especially heavy machinery that thickens surface as well as deeper soil layers;
- Chances to compact the soil are lower when wider implements or double wheels are used. Disturbance of the soil structure becomes smaller if wheels' slipping is avoided;
- Well-functioning drainage increases soil resistance to compaction; therefore, damaged drainage should be repaired with no delay. Table presented below shows the importance of soil moisture and compaction on crop yield. The yield can decrease by up to 9.9%. It is especially important for heavier soils.

To prepare the soil for spring sowing in autumn is not purposeful, because the soil becomes compacted quicker and the soil erosion increases.

Slopes of the hills should be ploughed across water flowing direction. Turning furrows upwards the hill could avoid the soil erosion and would also lift erosion products upwards, which were concentrated in the foot of the hill.

Hilly fields that give low yield are not worth to be tilled at all. If we sow perennial grasses on such fields we would not only prevent soil erosion, but we would reduce nutrient leaching too.

