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# **Soil-Water Conservation Engineering and Structures**

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# Conservation tillage

- Any method of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop, to reduce soil erosion and runoff.
- To provide these conservation benefits, at least **30% of the soil surface** must be covered with residue after planting the next crop.
- Some conservation tillage methods forego traditional tillage entirely and leave 70% residue or more.



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# Common conservation tillage practices

- Plow-till
- No-till (Zero Till)
- Ridge-till
- Zone tillage
- Mulch-till

(Each method requires different types of specialized or modified equipment and adaptations in management.)



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# Zero till or No till

- Zero tillage is an extreme form of minimum tillage. Primary tillage is completely avoided and secondary tillage is restricted to seedbed preparation in the row zone only.
- No-till is a way of growing crops without disturbing the soil. This practice involves leaving the residue from last year's crop undisturbed and planting directly into the residue on the seedbed.
- Cover crops (leguminous which are typically high in nitrogen can often increase soil fertility) can be used in a no-till system to help control weeds.





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## Zero till





# RIDGE TILLAGE

- In ridge-till practices, the soil is left undisturbed from harvest to planting and crops are planted on raised ridges. Residue is left on the surface between ridges. Weed control is accomplished with cover crops, herbicides and/or cultivation. Ridges are rebuilt during row cultivation.
- Ridge-till involves planting row crops on permanent ridges about 4-6 inches high. Maintaining the ridges is essential and requires modified or specialized equipment.





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**Soybeans growing in a ridge-tillage system**



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# MULCH TILLAGE

- Mulch-till is any other reduced tillage system that leaves at least one third (30%) of the soil surface covered with crop residue. It can be defined as a method which permits the crops to grow where most of the residues from previous crops are left on the soil surface.
- Mulching is defined as the application of any plant residues or other materials or cover the top soil surface for:
  - Conserving the soil moisture.
  - Reducing the runoff and thereby to control soil erosion.





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- Checking weed growth protecting from winter climate.
- Improving the soil temperature (winter climate) and organic matter.
- Modifying the micro - environment of soil to meet the needs of seeds for their good germination and better growth of seedlings.
- Intercepts the falling raindrops over the land surface and thus dissipates their kinetic energy.
- Maintains the soil relatively cool and moist which are essential for good plant growth.



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# Mulch-tillage





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# Benefits of organic mulch

- Very effective in reducing the soil erosion, because they promote interception loss and infiltration of rain water.
- They obstruct the impact of raindrops over the ground surface and thus dissipate the erosive power of rainfall.
- Very effective in preserving and improving the soil structure by eliminating the crusting of soil surface and sealing of pores by runoff.
- Organic mulches also chance the dew fall by insulating the soil thermally and electrically from the atmosphere.