TILLAGE

PURPOSES

- MANAGE PREVIOUS CROP RESIDUE
- DEVELOP A SOIL CONDITION FAVORABLE TO CROP PRODUCTION
  o ROOTBED
  o SEEDBED
- CONTROL WEEDS, INSECTS, PLANT DISEASES
- OTHER
  o DRY SOIL
  o INCORPORATE FERTILIZER, MANURE, LIME
  o INCREASE INFILTRATION
  o REMOVE COMPACTION

PRIMARY TILLAGE

- FIRST PASS AFTER HARVEST
  o MAJOR PURPOSE TO MANAGE RESIDUE AND LOOSEN SOIL
  o DEEPER (> 6 “)
  o FULL WIDTH
  o MOLDBOARD PLOW, CHISEL PLOW, V-RIPPER, HEAVY DISK
  o OFTEN IN THE FALL

SECONDARY TILLAGE

- USUALLY JUST PRIOR TO PLANTING
  o MAJOR PURPOSE IS TO PREPARE SEEDBED
  o ALSO CONTROLS EARLY WEEDS, INCORPORATE HERBICIDES AND FERTILIZER
  o SHALLOW (< 6 “)
  o TYPICALLY FULL WIDTH
  o LIGHT DISKING, FIELD CULTIVATOR, COMBINATION FINISHING TOOLS
  o NOT ALWAYS PROCEDED BY PRIMARY TILLAGE ON SOME SOILS OR AFTER SOME CROPS

TILLAGE CATEGORIES

- CLEAN (CONVENTIONAL) TILLAGE
  o < 15 % RESIDUE
- USUALLY FOLLOWING MOLDBOARD PLOW, HOWEVER ATTAINABLE WITH CERTAIN TOOLS OR FOLLOWING CERTAIN CROPS
- CONCERNS INCLUDE: HIGH TIME AND ENERGY COST, EROSION CONCERNS
- BEST SUITED TO FLAT, HEAVY SOILS THAT ARE POORLY DRAINED

- REDUCED TILLAGE
  - 15-30% RESIDUE
  - USUALLY FOLLOWING AGGRESSIVE CHISEL PLOWING
  - SOME SOIL PROTECTION
  - OFTEN RESULT OF SYSTEMS THAT COULD BE MODIFIED TO LEAVE MORE RESIDUE

- CONSERVATION TILLAGE
  - ANY SYSTEM THAT LEAVES AT LEAST 30% RESIDUE AFTER PLANTING

EXAMPLES OF CONSERVATION TILLAGE SYSTEMS

- MULCH TILLAGE: FULL WIDTH TILLAGE THAT LEAVES AT LEAST 30% RESIDUE
  - CHISEL PLOWS, FIELD CULTIVATORS, DISKS, COMBINATION TOOLS
  - GENERALLY FEW PASSES THAN CLEAN TILLAGE
  - OFTEN ONE PRIMARY PASS IN FALL
  - FIRST SECONDARY TILLAGE PASS DISTRIBUTES RESIDUE, INCORPORATES FERTILIZER
  - SECOND SECONDARY PASS IS JUST BEFORE PLANTING DESTROYS WEEDS AND PREPARES SEEDBED

- NO-TILL: SOIL IS NOT DISTURBED EXCEPT FOR CAREFUL FERTILIZER INJECTION
  - CONTACT HERBICIDES MORE COMMON
  - PLANTER ATTACHMENTS MAY BE USED TO CLEAR RESIDUE IN THE ROW
  - BENEFITS INCLUDE LOWER EQUIPMENT COST, TIME SAVINGS, MOISTURE CONSERVATION ON DROUGHTY SOILS
  - DISADVANTAGES INCLUDE POTENTIAL FOR YIELD LOSS, NEED TO INCREASE PEST MGT. INTENSITY, INABILITY TO INCORPORATE LIME AND FERTILIZER
- ZONE-TILL (STRIP-TILL): SYSTEM THAT PARTIALLY TILLS SOIL WHERE ROW WILL BE PLANTED
  - MAY BE DONE THE PREVIOUS FALL OR JUST PRIOR TO PLANTING
  - PLANTER ATTACHMENTS OR ATTACHMENTS ON SEPARATE TOOLBAR
  - MAY REQUIRE COORDINATION OF STRIP CREATION AND PLANTING
  - SIGNIFICANT AMOUNTS OF RESIDUE MAY BE LEFT IN THE ROW

- RIDGE-TILL
  - SEEDS PLANTED ON RIDGES FORMED THE PREVIOUS YEAR BY CULTIVATION
  - POPULAR ON SOMEWHAT POORLY DRAINED SOILS (TILED FIELDS)
  - MINIMALLY PRACTICED IN WISCONSIN
  - CHALLENGE TO PLANT
  - REQUIRES A CULTIVATION TO FORM RIDGES
  - NOT SUITED TO SMALL GRAINS OR FORAGES

OTHER TILLAGE PRACTICES

- ROTARY HOE
  - CULTIVATION BEFORE EMERGENCE OR WHEN PLANTS ARE SMALL (< 2")
  - INCORPORATE HERBICIDE IN DRY SPRINGS
  - BREAK UP CRUSTED CONDITIONS

- ROW CROP CULTIVATION
  - WEED CONTROL
  - BREAKS UP CRUST AND IMPROVES INFILTRATION
  - CATCH RESISTANT OR LATE-EMERGING WEEDS
  - INCORPORATE SIDEDRESSED N FERTILIZER
  - S-TINE OR SMALL SWEEPS FOR LOW RESIDUE CONDITIONS
  - UNDERCUTTING SWEEP FOR HIGH RESIDUE CONDITIONS

- SUBSOILING OR RIPPING
  - DONE TO BREAK UP COMPACTED LAYER BELOW NORMAL DEPTH OF TILLAGE
  - UP TO 16 "
  - CONFIRM EXISTENCE AND DEPTH OF LAYER
- SELECT TOOL THAT MINIMIZES SOIL INVERSION TO LIMIT RESIDUE INCORPORATION AND DIGGING UP STONES, CLAY, ACID SUBSOIL
- EXPENSIVE OPERATION
- SOME USE AS THEIR PRIMARY TILLAGE

MEASURING CROP RESIDUE

- LINE-TRANSECT METHOD
  - TAPE MEASURE OR KNOTTED ROPE
  - STRETCH DIAGONALLY ACROSS ROWS
  - COUNT RESIDUE AT EACH FOOT OR KNOT
  - ALWAYS LOOK STRAIGHT DOWN AND COUNT ON SAME SIDE OF TAPE
  - RESIDUE MUST BE LARGER THAN A BB
  - STONES DON’T COUNT, BUT MANURE DOES
  - % RESIDUE EQUALS THE NUMBER OF COUNTS OUT OF THE TOTAL

  25 “HITS” IN 50’ OF TAPE = 50% RESIDUE