

RESTORATION TILLAGE

A couple of hundred years of over grazing, destruction of the original savannahs, indiscriminate plowing, and mono cropping have depleted fertility and promoted and exacerbated erosion by wind and water.

In general those who would seek to reverse this trend will need to work toward minimal and appropriate tillage over the long term. Fortunately several tools have been developed to promote restoration of fertility and tilth without creating a plow pan or damaging soil structure.

First and foremost is the Italian Spader. Introduced in mid 1960's it was designed to approximate hand double digging. It's goal was to dig deeply without intermixing the top soil with the subsoil. It's unique design also permit it to penetrate very hard surfaces and to break up plow pans and natural hardpans without heavy or high powered tractors. The elimination of the traction component does away with tire slip, a major contributor to compaction.

The spaders mode of operation causes each slice of soil to be broken off at the bottom of the spade's stroke so that the subsoil base is left broken not cut or polished. Because the bottom of the worked area is left rough and unglazed it promotes percolation and root penetration. The spaders ability to work deeper than plows, discs and rototillers besides getting below the work pans these other tools created, helps plant roots react levels where moisture and temperatures are more constant. Deeper rooting with reduced fluctuations in temperature and less moisture stress improve plant vigor.



Plant residues, compost, cover crops and anything else on the soil surface gets well mixed into the top soil strata where aerobic bacterial action will quickly release nutrients and make them available to the crop. The spaders throwing action breaks up compacted soil into crumbs of various sizes.

The sizes of the crumbs will vary depending on soil type, moisture level, and organic content. By adjusting stroking speed, tractor speed, and timing of work you can always produce a worked soil ready for transplanting or for seeding large and medium seed in a single pass of the spader. In some soils direct seeding of very small seeds can be done in newly spaded ground. In other soils a secondary soil preparation step will be needed often just rolling with a smooth, ring or crowfoot roller is adequate.

Over the years spaders for tractors from 15 HP to 250 HP have come into use capable working 31 inches wide to 20 feet wide and digging 8" to 20" deep. At least one hundred distinct models can be supplied.



Another primary tillage tool worth considering is the Falc Rotoking. This is a rotary type tiller but differs from a rototiller in the design of it's soil opening components. Instead of "C" or "L" shaped tines that cleave and then "trowel" the soil overworking the top portion and smearing the underside of the cut, the rotoking has a rotor equipped with chisels. Each "chisel" is replaceable and mounts in a bracket on the rotor so that it penetrates soil point first. This action allows it to break up very hard ground including stony ground with less horsepower and does not glaze the bottom of the worked area.



The rotoking is also equipped with a (4) speed gearbox allowing you to adjust rotor speed to soil conditions so you can prevent overworking soil and avoid destruction of soil tilth and the resulting crusting of soil surface. In addition to being used for primary tillage the Rotoking is effective as a secondary tillage tool to perfect a seedbed after chiseling, plowing, stubble discing or spading, whenever clod size must be reduced to permit correct seed placement and coverage.



The rotoking also can be equipped with bed defining side plates, depth control wheels and a smooth rear roller to create a finished seed bed in a single pass. This configuration is called the FALC Cultiline. The larger model rotokings can be equipped with rear rollers and rear 3 pts to permit a seeder to be mounted so it can be deployed in the same pass as the rotoking eliminating one more trip over the field.



The Power Harrow is a tool designed for secondary tillage and thus used to reduce clod size from that left by primary tillage operation and to prepare a finished seed bed. The power harrow uses tines turning on vertical axis to create a stirring action and does not turn over the soil. These pairs of tines over-

lap each other from one side to the other so that entire surface is uniformly worked and is left flat across the width of the machine. The swirling action breaks up clods, uproots weeds and mixes surface materials into the top soil. Mounted on the tractor's 3 pt. on its front side and suspended by its rear roller it can be adjusted to work an inch or two deep or 5 or more inches deep. It is ideal for breaking up crusted soil and for airing out wet soil and incorporating soil amendments.

A rear 3 pt. can be added to the larger power harrows so that a grain drill can be carried and deployed to save trips across the field. On occasion power harrow Seeder combination have been used on a tractor's rear 3 pt. while a spading machine is driven by the same tractor's front PTO, to truly reduce trips over the field.



When very large acreages are to be worked two remarkable machines are worth considering because they accomplish their work at dramatically higher speeds than those referred to above. The first of these is the Falcland; in effect this is a PTO driven rotary chisel that opens up soil 17.5 inches deep while traveling up to 3.5 miles per hour using about 150 HP.



The second of the higher speed tools is known as a Dynadrive. This unusual machine is ground powered rather than PTO driven. Two rotors with "spoon like" tines churn up to the soil incorporating grass or grain stubble. The front rotor drives the rear rotor at a different speed to tear up roots and leave a well worked surface. The scrubbing action becomes more effective the faster the machine is pulled working at speeds up to 7 mph. With models from 6.5 feet to 16 feet wide the amount of ground worked in a day is impressive.