new soil implement makes a good impression

By R. M. Dixon

THERE ARE VAST areas of this nation that are barren. Some of these lands have always been barren, some are now barren due to misuse. Pastures and rangelands that have been overgrazed, cropland that has been overtilled, land hit by short-term drouths, and land disturbed by strip mining or highway construction can all fall into this latter category.

Unfortunately, the total acreage of barren land is increasing at the same time as the population is growing, and needing additional food and fiber.

A number of tillage and planting implements have been used to reclaim some of these lands—some implements work, others make matters worse.

But we have come up with what might be called the ultimate no-till tool for such barren lands. This tool requires only a 30 horsepower tractor to pull it, and the tool does several distinct things to the soil at the same time.

- It prepares a runoff segment to transfer rainfall to the area where the crop will be planted, thus concentrating the small amount of water that falls on the land where it will do the most good.
- It prepares a seedbed suitable for planting (and with attachments does the actual planting also).
- It provides a rough surface that retards wind and water erosion.
- And it provides a nearly ideal environment for seed germination and growth.

All of these tasks are accomplished by a machine that has only one moving part.

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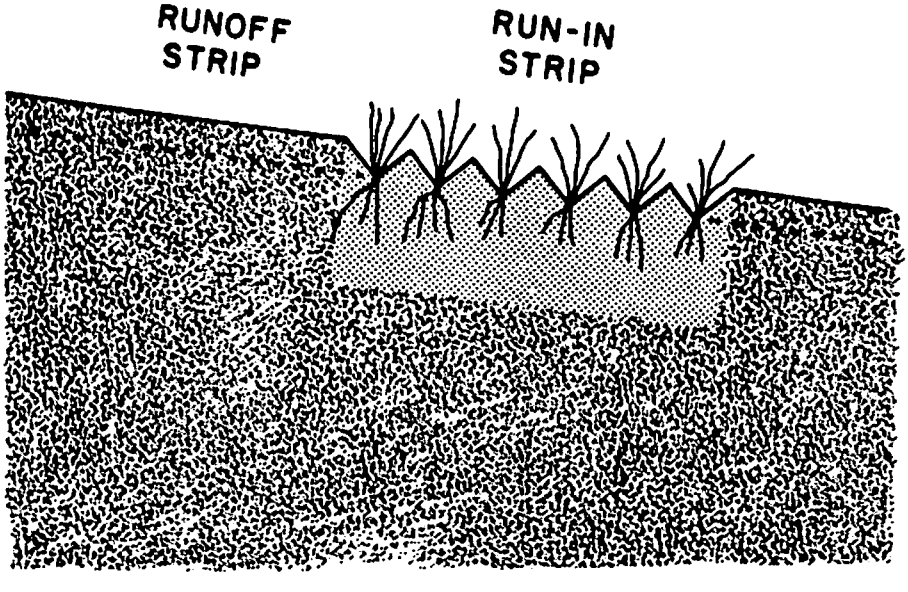
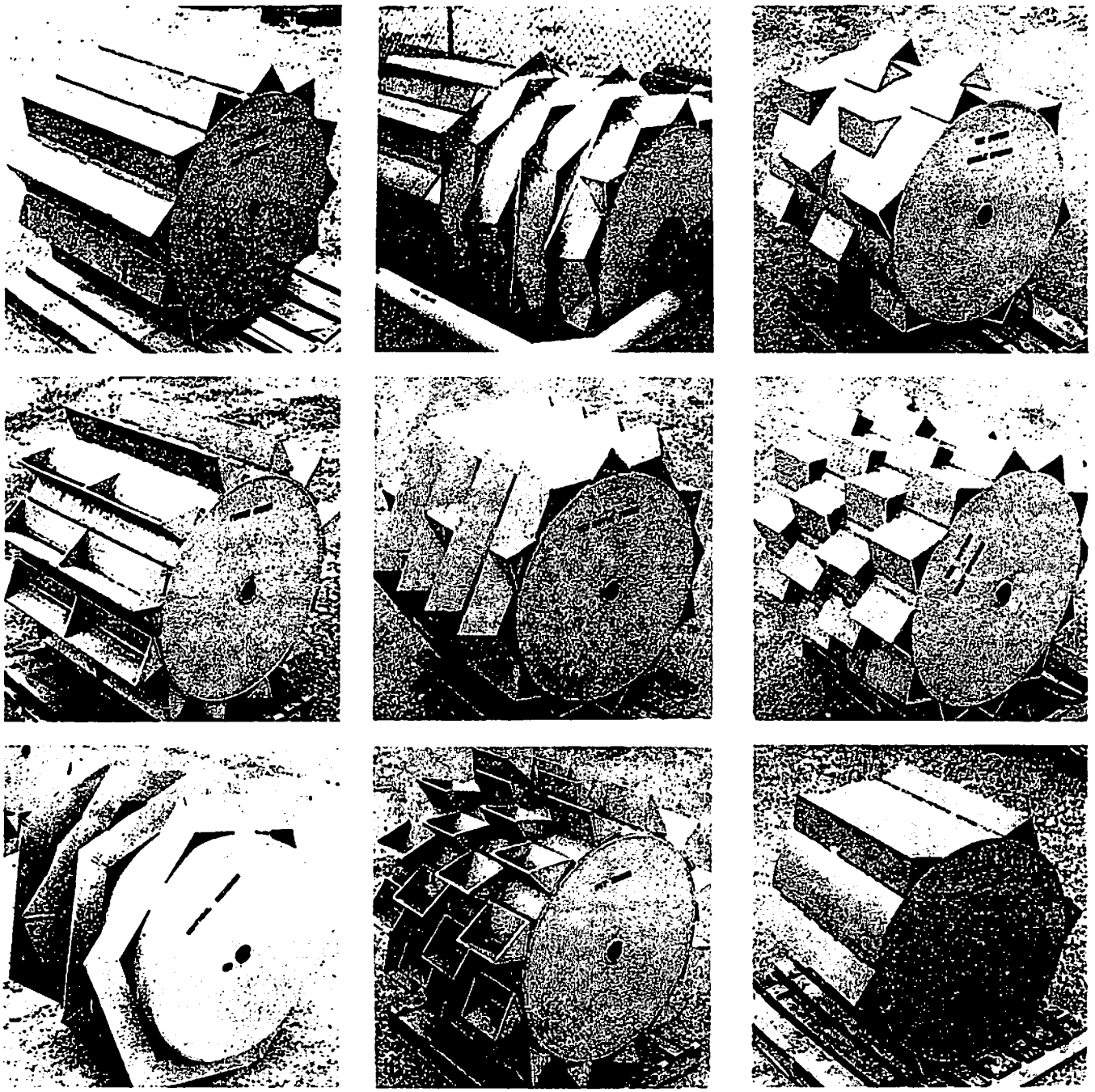
Imprinter

The tillage machine is a land imprinter. It is a practical application of a decade of water infiltra-

Half of the impression cylinder produces grooves in the soil that directs rainfall into the other half, which concentrates the moisture and creates a place where a crop can grow.





Some of the impression cylinders for the new no-till device.

tion research. The imprinter consists of a drum that is about 3 feet in diameter and 6 feet long.

Half of this drum has a corrugated face that imprints slots or grooves into the soil which will direct rainfall into the other half of the imprint.

The other half can be made up into a number of shapes, but all of them form a geometric pattern that has V-shaped bottoms to catch and retain the seed and soil moisture.

Due to the shapes involved, the corrugated section quickly seals over during a rainfall and transfers the water to the seed area. And the falling rain quickly buries the seed, retains moisture, and insures rapid germination and a good stand.

The drum itself is hollow and made from 1/2-inch steel plate. It can be filled with water to increase the weight to about 3 tons. In addition, 2 more tons of steel bars can be mounted on the frame. So the machine can be used on heavy soils, can help chew up vegetation to provide a mulch, and can press rocks into the soil if need be.

Since the imprinter rolls like a wheel and does not lift nor disturb the soil like plows or discs, a large horsepower tractor is not needed. We have gotten satisfactory results with a 30 hp tractor.

The points of the imprinter face are made of 6-inch angle iron and hardfaced so that they are self-sharpening.

Seeding

Seeding of a crop can be accomplished in a number of ways. A U-shaped bar can be inserted into the A-shaped frame of the imprinter and conventional seeders mounted directly on it. Or the

seeds can be flown on by airplane after the soil is imprinted.

Due to the V-shaped configuration of the furrows, the seed falls to the bottom of the furrows in a precise pattern. Seeding is as accurate as if it had been done by a drill.

Normal rainfall will do a good job of burying the seed, but small disks or wheels can also be mounted on the U-shaped bar or a chain can be dragged to bury the seed.

The imprinter leaves virtually all of the above-ground plant material on the soil surface where it can retard runoff, sealing, and evaporation, and enhance the roughness and porosity which increases water infiltration.

The imprinter also kills the above-ground growth of brittle, shrubby plants, thus helping cut transpiration of water and further creating a good environment for the crop being seeded.

Construction

The imprinter has only one moving part in the form of a compound roller and central axle which turn together as a rigid assembly during operation.

The roller itself is actually two separate capsules, each about 3 feet wide and 3 feet in diameter. These are linked rigidly together by an axle-pulling clamp on the axle and by a sheet of rubber between the drums to keep them from turning independently of each other.

The imprint faces are made up of lengths of angle iron welded to the surface of these drums. As mentioned before, the points of these are handsurfaced.

Thus far we have developed 10 interchangeable imprint capsules or rollers; thereby giving us 45 different possible combinations for the compound roller.

Operation

The imprinter performs a number of functions. It can crush brush and small rocks and imbed these in the soil. It also speeds runoff from one area and induces infiltration in another, creates a concentrated mulch, forms a vertical mulch, and prepares a seedbed.

Other functions include wind and water erosion control, surface compacting, and surface digging.

The particular job or jobs to be done will dictate which of the 45 combinations will be used.

The soil should be somewhat moist for best soil impression, but it should not be so wet that the soil sticks to the imprinter.

Compared to other minimum tillage implements, the imprinter would have a slightly higher initial cost, but lower operation and maintenance cost and greater versatility. Since it has only one moving part, made from thick steel plate and angles, it is virtually indestructable.

The only maintenance required is to grease the axle bearings during use and to coat the imprinter points between use with fuel oil to prevent rusting.

With axle modifications it might even be possible to replace the rear wheels of a tractor with imprint capsules, thus making the imprinter self-propelled.

Two implement manufacturers have expressed interest in the imprinter and are considering building it for commercial sale. We can't say right now, though, when the device may actually go on sale.

The experimental imprinter we built is currently being used to increase rangeland and forage production in Arizona. But it may someday find use in croplands either as a secondary tillage tool or as the sole implement for preparing a seedbed.

This device could lead to increased and more stable yields of corn, soybeans, grain sorghum, and wheat in drylands. The imprinter could eliminate the need for fallow in some wheat-growing areas of the Great Plains. It could also be useful in an area where double cropping is not now possible due to lack of moisture for the second crop. □

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