AGRICULTURE

Plowing Goes Underground

New method revolutionizes American farming, leaving stubble standing to reduce wind and water erosion; more victory food and fiber will be produced.

By GLENN SONNEDECKER

➤ WITH THE STEADY PLOD of the man with the plow, subsurface tillage is forging out of the Northwest, spreading through the Great Plains, down into the Piedmont district. It is revolutionizing much of American agriculture as surely as the blitz and panzer have changed our concepts of war.

The modern Army still "marches on its stomach" and America may well beat the outmoded sword into a plowshare, for the new tillage method means more food—fuel for fighters, sustenance for civilians.

An increasing number of progressive plowmen no longer smell the dank odor of fresh soil; nor see the long furrows of upturned sod. Old-timer shakes his head sadly, for to the unfamiliar eye subsurface tillage just looks like bad workmanship.

The new plows let the trash and stubble remain on top of the ground. Odd-shaped blades cut through the soil without turning it over. To plow under this residue was thought to be the main objective by many farmers. Now the land looks as if it wasn't even plowed at all. Face of the farm looks stubbly, grubby—like the face of an unshaven man.

Results Count

Old-timer shakes his head obstinately —until he sees results. That's what counts. Winds sweeping out of the West do not blow away the fertile top soil, as happened in the past. Disastrous "dust bowls" are much less likely to occur.

Rain, beneficent but often a bane, no longer erodes the soil, reduces the crop, or makes the land sterile. Stubble left standing by subsurface tillage anchors the ground in its place. It keeps the surface loose and open so the water sinks into the field to be stored for the dry days to come.

On an ordinary plowed field the pelting of the rain soon compacts the top surface of the fresh soil so that the rain runs away. It is not only wasted, but takes the top soil with it, resulting in erosion.

More American fields are being subsurface plowed this fall than ever before. This winter the earth will pull the white blanket more closely about her. Crop residues will catch and hold the snow until it melts, reduce the eroding runoff, and keep the moisture stored below to help boost the young food plants skyward.

Controlling insect pests is another function of subsurface tillage. Just how effective it is, remains an open question. The answer must await further experimentation, Gordon K. Zimmerman, of the U. S. Department of Agriculture, explains.

Very effective control of saw flies is reported by C. S. Noble, Canadian pioneer of subsurface tillage. The grubs are raised and left in a more exposed position, he reports. Tests show that a large percentage of them do not survive.

Grasshoppers can be controlled by leaving a strip of land unbladed. These are traps. Grasshoppers lay their eggs in the nearest firm soil. Then late in the fall, and again early in the spring, the trap strips are lightly cultivated. This destroys nearly all 'hopper eggs, Mr. Noble declares.

Disadvantages of the subsurface method are few. Experiments indicate that nitrogen in the soil, necessary to crop growth, is often not used properly under the new conditions.

Rotting of stubble is not as good as when turned under by the old method.

More effort may be required to control weeds. This is especially true during an unusually wet year. Manufacturers of the subsurface implements are improving a blade-weeder attachment, however, which controls weeds by shearing the root systems, yet leaves the stubble erect with a minimum disturbance of surface soil.

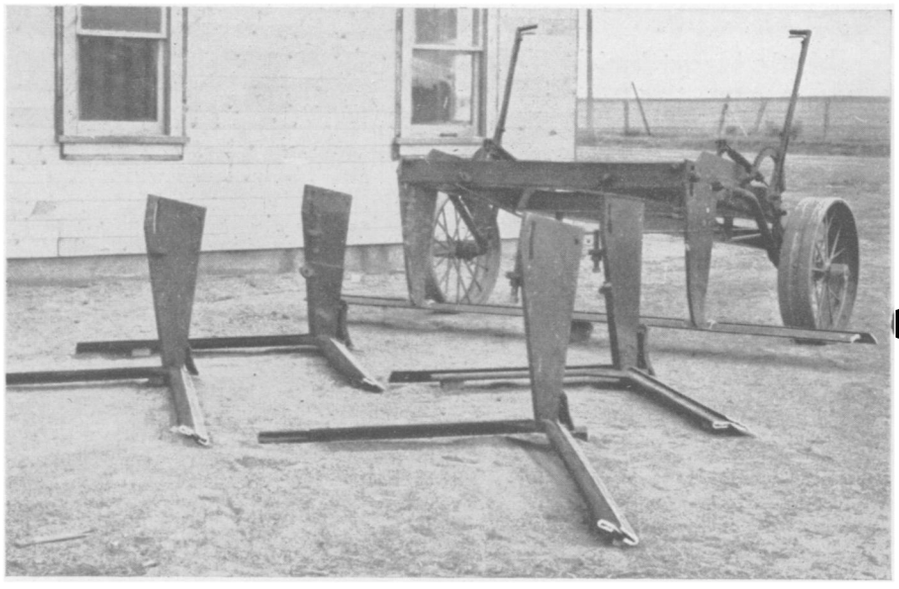
Other research is being conducted by the Soil Conservation Service.

Experiments Are Conclusive

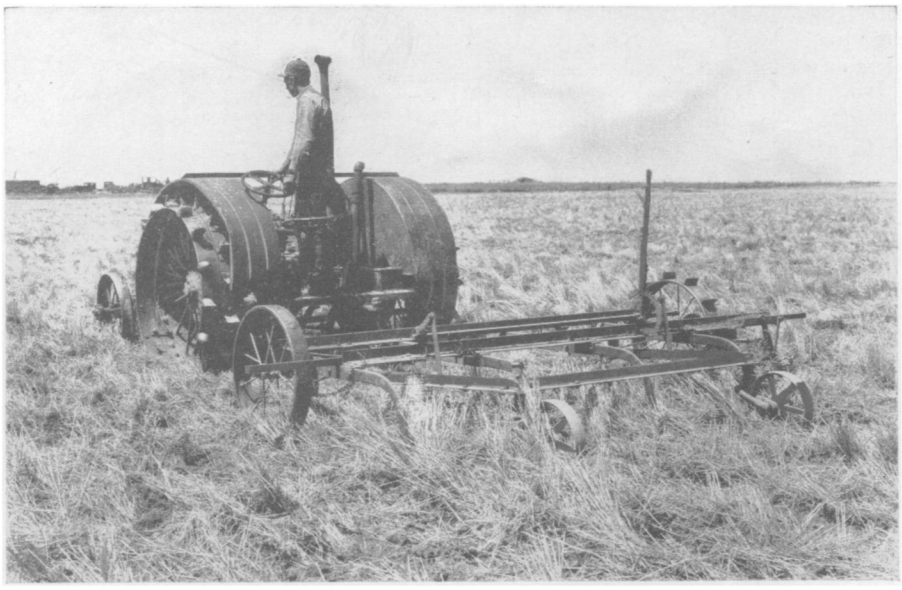
Experiments at the University of Nebraska have conclusively demonstrated that crop residues protect the soil against high runoff or excessive erosion by wind or water, and slow down evaporation.

As the studies at the Nebraska station and those at other experiment stations progress, and as farmers have more experience with methods of utilizing crop residues, the practical nature of these methods and their adaptation to different sections will be established.

Subsurface tillage was unknown to American farmers until the last few years. Its use is now fairly common in



SEVERAL TYPES of implements are used. The straight blade attachment at the rear is used to till the soil. Those in front are cultivator and weed sweeps.



***SUBSURFACE TILLAGE** on the Great Plains leaves crop residues on top to protect top soil from being swept away by wind and rain. Besides higher yield, the new method will help prevent tragedies of erosion such as occurred during the all-out effort to produce food and fiber during the last war. See illustration on the front cover of this week's SCIENCE NEWS LETTER.*

the Northwest and Great Plains, Mr. Zimmerman points out, and is especially helpful in areas plagued by erosion. Subsurface tillage will become more and more valuable in the Piedmont region also, Mr. Zimmerman predicts.

It is expected that a very large part of the country will eventually adopt the new method. Slowest development will probably be in the Eastern corn belt, authorities believe.

Much work has been done, particularly in the West, to develop satisfactory farm implements for the new type of cultivation. The soil must be thoroughly worked, all plant residue evenly distributed on top of the soil.

One tiller runs a wide shallow blade, mole-like, beneath the surface with only the stem-like shaft breaking the soil.

Variations range to a modification of the duck-foot shovel, with the wings lengthened and mounted so that the cuts overlap.

Duck-Foot Shovel

The old rod weeder has come out in a new guise with a modified duck-foot shovel that rides in front of the rod. This is good for use in hard ground.

If the ground is too loose to make a good seedbed, the soil must be packed a little. A rotary hoe with the wheels reversed does this job satisfactorily without burying the straw or dragging it into bunches.

The ordinary moldboard plow can be converted to a stubble-mulch tillage implement by merely removing the moldboard. The plow will then lift and break the soil without turning it over.

Ordinary implements may be used to plant the fields but surface trash often causes trouble. Several new types of drills have been tested. One of the most successful has flat disks set at a slight angle and a wing attached to each shoe to brush the residue aside until the wheel passes. This plants the grain in a clean furrow but leaves the residues on the surface between rows.

Cultivate with Sweeps

Similar disk furrow-openers are attached to corn planters. Farmers cultivate with large sweeps attached to the cultivator, again leaving the residues spread over the surface throughout the season to increase water intake and reduce erosion.

Adequate supply of implements may be curtailed, as need for war materials cuts down manufacture. Some farmers have rigged home-made apparatus. In any case, it is probable that these principles and practices will play an increasingly important part in boosting the production of food and fiber that is needed to insure victory.

If the West, both in the United States and Canada, passes through the present stress of war production without developing a new Dust Bowl, subsurface tillage can claim a considerable share of the credit.

This "earthworm method" of loosening the soil also produces bigger yields. Five more bushels of wheat per acre from a test field were reported by Edmund Heying of South Dakota, with easier handling of the soil.

Results are due to ease of root penetration and more available moisture.

At the soil and water conservation experiment station at Clarinda, Iowa, over half of the rainfall was stored in soil that was surfaced with two tons of straw per acre, and tilled by subsurface methods. Under ordinary summer fallow, where the turned sod lies bare to store moisture, only a fifth of the rainfall was retained.

Implements Being Improved

C. S. Noble, one of the founders of the new system, is continually improving his implements. This year's models, he predicts, will do the job better with less draft and upkeep. The machines are also being designed in various sizes and types to give the best efficiency under varying conditions and soils.

In the Pacific Northwest, for example, a rough cloddy condition of the surface gives best protection. Modification of tillage implements produce these clods and bring them to the top while all residues still remain on the surface.

Stubble left in an upright position is believed best on the Great Plains where blow hazard is the main problem and it is desirable to collect and hold the snows.

"With the gradual adoption of the trash cover and subsurface tillage in this area," Mr. Noble reports from Alberta, "our whole conception of scientifically correct tillage methods is being transformed.

"We no longer cultivate with weed control as the only consideration. We cultivate now—or defer cultivation—to

control insect pests as well as weeds, and in cultivation we avoid turning the soil over to dry out, or covering its natural protection against erosion.

"It is much more than a new method of cultivation or of soil conservation we are adopting," he concludes. "It is from top to bottom a new system of dry land farming."

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PUBLIC HEALTH

War on Venereal Ills

U. S. Public Health Service plans all-out attack on menace to war effort. Federal quarantine areas will be established if it becomes necessary.

➤ THE U. S. Public Health Service is preparing to go to the extreme limits of its authority in all-out war on venereal disease which threatens to sabotage our war effort by its inroads among the armed forces and the army of war industry workers.

Establishment of Federal quarantine areas has even been discussed, but officials are hoping this last resort will not be necessary. Instead they are going into immediate action on an alternate plan calling for State health department cooperation. First steps under this plan include:

1. Appointment of Dr. Udo J. Wile, professor of dermatology and syphilology at the University of Michigan Medical School, as medical director in the U. S. Public Health Service Reserve, to inaugurate and direct clinical work in an intensified drive on syphilis. Dr. Wile has just been released by the University of Michigan for this public service.

2. Establishment in critical war areas of perhaps 25 State-Federal quarantine hospitals for segregation and treatment of prostitutes and other recalcitrant persons capable of spreading syphilis. The Federal health service will staff and operate these hospitals, under Dr. Wile's direction, with State health departments taking responsibility for rounding up and sending the prostitutes or others spreading syphilis. The Federal health service presumably will also find the hospitals and make them available to States lacking such facilities. CCC camps, it is thought, might be made available for this purpose.

3. Recruitment and training of 25 doctors, 60 nurses and 20 or more record analysts under Dr. Wile's direction. The first training course of six weeks is to start Nov. 15 at Ann Arbor, Mich. The doctors will get additional training in Detroit and the nurses at Cook County Hospital, Chicago. As more hospitals are set up, more doctors, nurses and analysts will be trained to staff them.

Intensive methods of treating syphilis, which apparently cure the patient in a few days or weeks, instead of the 18 months required by earlier programs, will be used in all quarantine hospitals. Part of Dr. Wile's job and the jobs of the newly-trained record analysts will be to determine which of these various quick treatments are most efficient and economical. So far most of them have only been used on small groups of patients and their effectiveness and safety need further evaluation.

The one-day combined chemical and fever treatment for syphilis developed by Dr. H. Worley Kendell and associates of Dayton, Ohio, is already being given a thorough trial under Federal-local health department cooperation at Wesley Hospital, Chicago. Dr. Kendell is in charge of the treatments there. This hospital, however, is not one of the quarantine hospitals, most of its patients coming voluntarily.

The record analysts, besides keeping records for evaluation of the new treatment methods, will also take charge of vocational guidance of the prostitutes after treatment and release. Long-time social and personality rehabilitation of the prostitutes may be undertaken later, but the present plan calls for job placement only. As one public health service worker put it, the idea is to "clean them up and get them jobs."

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● RADIO

Saturday, November 14, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

D. W. Kaufman, chief chemical engineer of the International Salt Company, will discuss salt and describe its uses in war industries.

Tuesday, November 10, 7:30 p.m., EWT

Science Clubs of America programs over WRUL, Boston, on 6.04, 9.70 and 11.73 megacycles.

One in a series of regular periods, over this short wave station to serve science clubs, particularly in the high schools, throughout the Americas. Have your science group listen in at this time.

Monday, November 9, 9:15 a.m., EWT; 2:30 p.m., CWT; 9:30 a.m., MWT; and 1:30 p.m., PWT

Science at Work, School of the Air of the Americas over the Columbia Broadcasting System, presented in cooperation with the National Education Association, Science Service and Science Clubs of America.

"Communications" will be the subject of the program.

GENERAL SCIENCE

German and Other Enemy Books To Be Republished

➤ SCIENTIFIC books of enemy origin will be made available for America's war and educational effort through the cooperation of the Office of Alien Property Custodian whenever there is a real need for them, according to plans now underway.

Through republication by any appropriate means, including photolithography, and microfilm, it is hoped to supply any research worker or library needing fundamental scientific treatises usually obtained from German or other enemy publishers.

The Alien Property Custodian has asked the cooperation of the American Documentation Institute, Science Service and other scientific organizations in obtaining information on what books of enemy origin should be made available under this new plan.

Research scientists, laboratories and libraries are requested to send suggestions as to books needed directly to the Alien Property Custodian, National Press Building, Washington, D. C.

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The browning or *rusting* of evergreens so apparent at this season of the year is nature's way of pruning these trees, and is not due to insects or disease.