

'Tuning' the soil is

No-tillage practices cause the soil to become hard and disease prone. Nothing is returned

By Dieter Krieg

WILLOW STREET — Few farmers can accurately see the relationship between soil tillage and soil fertility, but relationships do exist — tillage and fertility affect each other — says Robert Boehle of Brookside Farms Laboratory Association. The plow is obsolete, according to Boehle and the organization he represents.

The chisel plow and offset disk are taking over, or at least they should, if Boehle's advice is followed. Water and air penetration within a soil are more important than applied fertilizers, they say. The soil-testing organization also believes that: Crop residues should not be plowed under, but rather "incorporated" into the soil. Properly managed fields on a hillside will retain water even if they're bare,

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Representing a firm which works in 23 states, Mexico and Canada, Boehle was in southeastern Pennsylvania last month to conduct a series of meetings on soil management. Brookside Farms, which provides only a service, rather than sell products, prides itself on being a research organization which uses the individual farm in its scientific work, the results of which can be applied directly to that farm.

Using a series of slides depicting various soil conditions and stages of crop development, Boehle pointed out a number of things which can directly affect soil productivity, erosion, moisture content, fertility, and the interrelationships between biological, physical and chemical soil properties.

All crops need (1) fertility, (2) water, and (3) air within the soil, Boehle began. "The soil is alive, it's a natural living system and the processes going on within it can affect the business of crop production," he emphasized. John Campbell, who also works with the firm as a consultant in this area, commented later that "if you work properly with the soil it will take care of you, but if you abuse it, it'll clobber you."

The three soil properties (biological, physical, and chemical) are all interrelated — you can't work with one without affecting the other, Boehle stressed. He noted that chemical properties are the ones farmers are most familiar with, but the least important in crop production. "We must learn more," he said.

The availability of air and water is one of the more important considerations in soil management. To illustrate this point, Boehle showed pictures of a field of corn which appeared to be lacking Nitrogen. He pointed out that the situation came about after a heavy rain which left fields soaked. Warm weather then dried out the field and left it with a hard crust on top. To correct the situation, the farmer applied Nitrogen by cutting it directly into the soil. "The change in color you see here," Boehle said as the next slide appeared on the screen, "is not due to the applied Nitrogen, but because the soil's crust was broken by the N applicators. The N had little to do with it — the change in color is due to an exchange of Oxygen and carbon dioxide within the soil which was previously restricted because of the crust."

Another practice recommended by Brookside Farms is

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chisel-plowing. The rather simple explanation is that after years and years of plowing, the ordinary plow forms what is known as a "plow sole" — that is the tightly compacted layer of soil on which the plow's bottoms are dragged along. This "plow sole" severely restricts the movement of air and water within the soil and also hinders deep root penetration.

Using facts and figures gathered by Brookside Farms as well as data from several universities, Boehle showed graphically how water moves within the soil. "The particle size of soil affects the movement of air and water, hence a compacted layer will restrict movement," he said. The slides showed how water penetration actually came to a halt once the soil was no longer worked up properly. Likewise, other slides showed instances of how roots touched the "plow sole," attempted to penetrate, and finally just curled away in another direction.

Chisel-plowing breaks up the compacted layer and allows water and air to penetrate and move more freely, the Brookside Farms employee clarified. "The water goes down deeper, and can be stored — it improves drought resistance and leaves fields less prone to erosion," he pointed out.

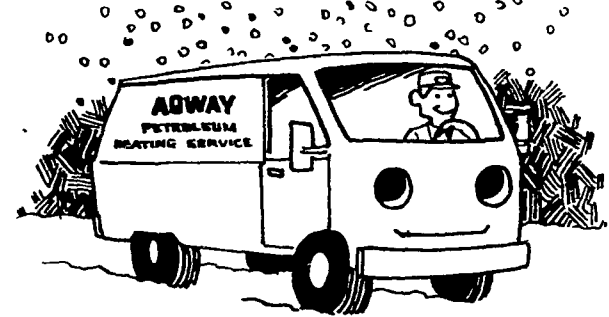
Explaining chisel-plowing in more detail, Boehle said a penetration of one-half to three inches below the plow sole is sufficient and there is no known advantage to going deeper than that. A wide-spacing of no less than 24 inches, but not more than about 40 inches between shanks is of uppermost importance, according to Boehle, because a



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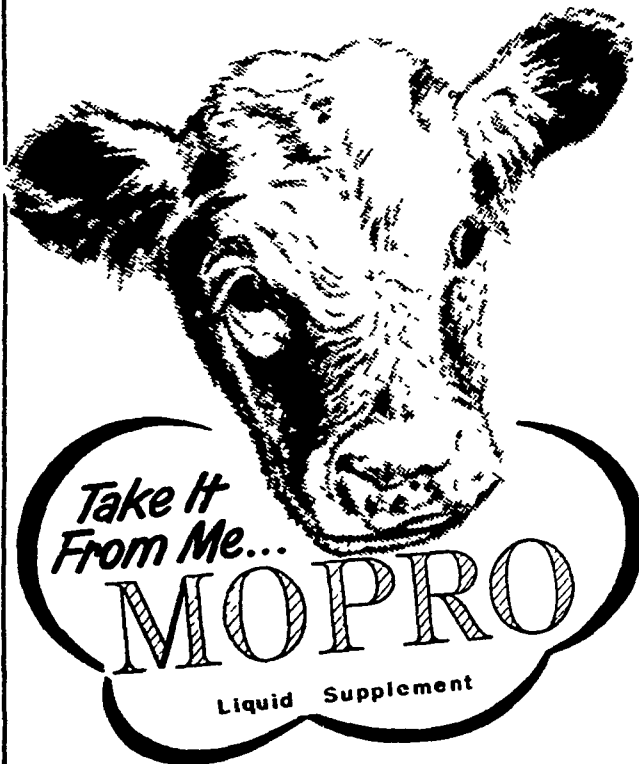
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