

The Living Soil and Biological Agriculture

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While farmers struggle from season to season to maintain their financial solvency, the fertility of their over-taxed fields continues to decline. Economics gets the headlines in the mass media while soil erosion quietly robs the land's productive capacity. Soil erosion is an omnipresent phenomenon wherever the earth's surface is tilled or has its protective vegetation cover disturbed.

Erosion, "the great leveler," is not necessarily even-handed in its theft of topsoil; its power is increased by the steepness of the slope. Thus hill-lands and sloped fields suffer first and most. Fields become more susceptible to erosion as soil structure deteriorates under repeated tillage. Plow pan, surface crusting, and loss of organic matter all facilitate the speed and power of water moving through the soil, carrying along vital nutrients and topsoil. Dry, exposed soils are caught by sweeping winds which lift the finest particles and carry them away in clouds of dust.

While primitive farmers have been slower to degrade the natural fertility of their land, due primarily to their inability to carry out deep and frequent tillage, the long-term destruction of their homelands has been accomplished through deforestation, over-grazing, and salination of irrigated bottomlands. Here in North America the moldboard plow, drawn by ever-increasing horsepower, has accomplished in decades what has taken centuries in other civilizations. And although the days of the American Dust Bowl remain in the living memories of older farmers, precious little seems to have been passed on to the current generation of economically hard-pressed farmers.

It was observed by the "father of the plow," Jethro Tull, that "tillage is manure." The ecological advantage gained through turning under native vegetation has a two-fold function. Reduction of competition to crop plants is accompanied by the release of nutrients contained in humus and plant residues. The stirring of the topsoil provides aeration for bacteria and other microorganisms, which change complex forms of nitrogen and carbon-based organic compounds into readily useable nitrates, nitrites, sugars, and other powerful biological "fuels."

Dr. William Albrecht, in the 1938 *USDA Yearbook, Soils and Men*, put the American agricultural process in perspective: "The stock of organic matter in virgin soil taken over by the homesteading pioneers was a heritage from an extensive past... The organic matter that held the major stock of previously mobile nitrogen and minerals kept these essentials stored in compounds not simple enough for prompt consumption by growing plants.... " But with the removal of water through furrows, ditches, and tiles, and the aeration of the soil by cultivation, what the pioneers did in effect was to fan the former simmering fires of acidification and preservation into a blaze of bacterial oxidation and more complete combustion. The age-old process was reversed and the supply of organic matter in the soil began to decrease instead of accumulating.

The managed release of soil-bound nutrients and energy for food crops, while replacing biological raw materials and providing an environment conducive to active nutrient cycling, is the essence of biological agriculture. In the following sections of this special supplement we will examine the key elements of applied ecology known as agriculture, and we will point to techniques, tools, and systems that offer a new degree of sustainability to agriculture. Whether

or not modern market-dominated economics allows many commercial farmers, whether of “organic” or “chemical” persuasion, to survive, the health of the land and the people it supports will be the final criterion for success.

MIKE MAKI compiled the articles for this special soil supplement to the Tilth journal. Mike was at the time a member of the Maritime Permaculture Institute and is was developing a small farm in Southwest Washington.