Sea Energy in Agriculture

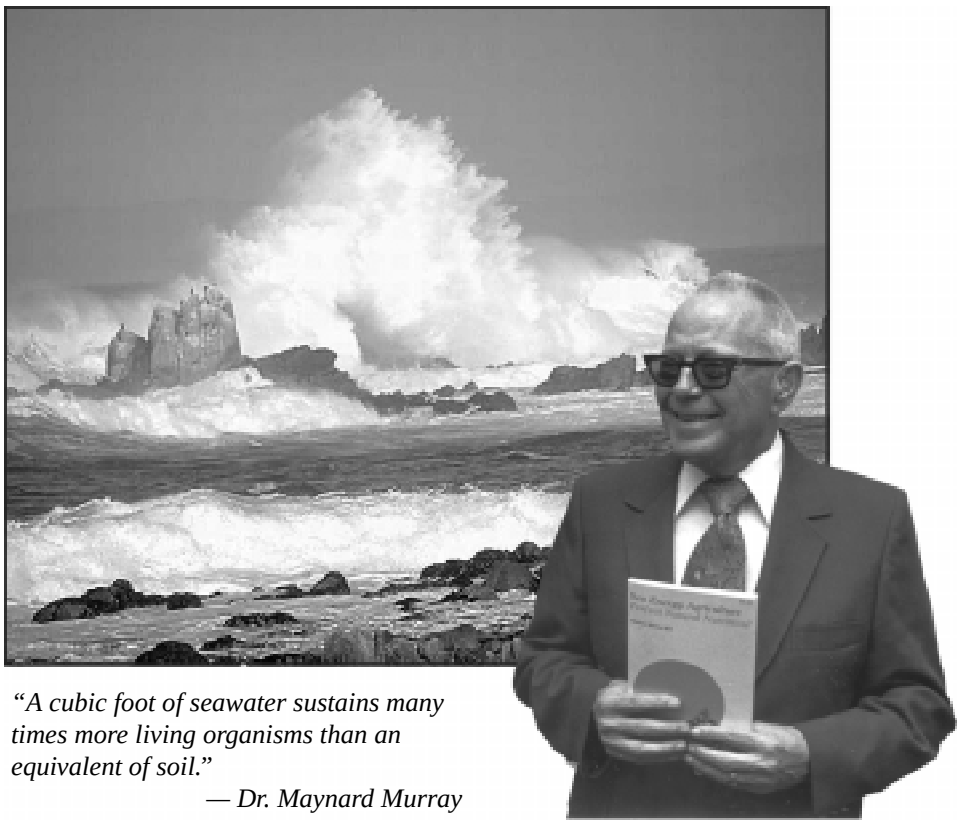
Renewing the Soil with Sea Solids

by David Yarrow

In the early ages of our planet, water dissolved minerals from crystal bedrock, washing them into a vast ocean. Rain and ice scoured the infant orb's dense granites and then flowed into streams and rivers, which all ran together into the sea. Minerals in endless flowing solution accumulated in the ocean over many millennia.

Sea salt has all the elements needed for life. Over countless years, land has been worn down by wind and water, and elements washed out to sea. Thus, the sea received the enormous chemical richness and balance that once supported life on land.

So, when we savor the flavor of food, our fundamental seasoning is salt — the sea its original source. Natural sea salt is a faint gray-green, with soft, complex crystal structures, but today's table salt is only sodium — pure white cubic crystals of chloride. All other seawater elements have been refined — removed and taken out. Gone is the iron; lost are potassium, calcium and magnesium, as well as more minor minerals and trace elements than we can yet measure.



"A cubic foot of seawater sustains many times more living organisms than an equivalent of soil."
— Dr. Maynard Murray

MID-CENTURY SCIENCE BIONEER

Dr. Maynard Murray was a pioneer in biology, health and agriculture. His lifelong quest taught him that the key to health is a secret in soil, a secret whose source is the sea. A medical scientist, he recognized evidence of an all-encompassing unity for life on Earth. His inspiration came from his study of the ocean.

In 1947, Murray began a 25-year medical career, specializing in ear, nose and throat. Experiences with patients aroused his concern for the quality of life. While Americans lived longer, medical practice revealed they weren't living better. Chronic illness and degenerative disease slowly but steadily increased.

Pointedly, he wrote, "Americans hold the dubious distinction of being among the sickest of populations in modern society," adding, "A nation with a drug industry flourishing as well as ours certainly cannot claim good health!"

FIRST CLUE

As a university student, Murray had tried to induce cancer in a toad. He was astonished to learn that the amphibian had natural immunity. He sought answers in ocean animals rather than freshwater and land animals. Time and money was spent traveling to study and dissect sea life from South America to the Pribilof Islands.

"A cubic foot of seawater sustains many times more living organisms than an equivalent of soil," he noted. "Seawater is literally alive, especially if its temperature is warm."

Murray sliced open whales and autopsied dolphins and marine mammals searching for organic degeneration, but he saw little sickness in the sea. Ocean animals, he discovered, did not develop the degenerative diseases that plague man: "Looking at ocean life, one is immediately impressed that in this 71 percent of earth's surface, there is no cancer, hardening of arteries, or arthritis. Disease resistance in sea plants and animals differs remarkably from land animals. Ocean trout don't develop cancer, while freshwater trout over five years have liver cancer. It's difficult to find any land species without cancer. All land animals develop arteriosclerosis, yet sea animals are never diagnosed with this."

Murray noted that aging hardly occurs in the sea. Comparing cells from adult vs. newborn whales showed no evidence of the chemical changes observed in land mammal cells. Some sea denizens seem to never cease growing. Comparing the sizes of land vs. sea turtles reveals the tremendous difference.

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ACRES USA
A VOICE FOR ECO-AGRICULTURE
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IT'S LOGICAL

Murray pondered over what could impart this apparent immunity to sea animals. Was it a nutritional factor? Was it caused by minerals, or some more complex chemical factor?

Simple reasoning reveals that minerals in soil leach out with rain and snow, flow-

ing into oceans via streams and rivers — the land's mineral fertility winds up washing into the seas. Minerals lost from land accumulated in the sea for millennia. This progression suggests that seawater minerals are key nutrients responsible for the heath of sea life.

"Seawater is Earth's most ancient natural solution," Murray said, "and, in my opinion, most ideal, physiologically. In the sea, as liquid crystalloid, all Atomic Table elements are in a solution of consistent balance and proportion, available to all sea life."

Murray noticed the elements in seawater are essentially the same as in blood, and very close to the same quantities. This seemed no coincidence, but a true clue to the role of minerals in health. Might mineral deficiency be a significant cause of degenerative disease? If humans get a full menu of minerals, will our physiologic disorders decline?

But how could humans assimilate these necessary nutrients? Drinking seawater isn't possible — humans aren't designed to ingest minerals as salts, or rocks, for that matter. Our guts can't absorb elements in raw, naked, ionic forms. Rather, human intestines need minerals to be packaged with sugars, amino acids, fats, oils.

"Table salt is the only food we eat that's inorganic," Murray noted, "and frankly, it isn't good for us." He summed up his thesis: "Ocean waters hold a perfect balance of essential elements required as food for the complex cell groups that make up our bodies."

SEAWATER INTO SOIL

As a first step to learning how to supply minerals to humans, Murray realized that we get our minerals primarily from food, but that water is the second most important source. He decided to use seawater as a soil amendment, and observe whether this provided any benefit. Perhaps if soil is supplied with all essential minerals, plants will absorb them as nutrients and pass them on to the animals that eat them.

In Murray's first trials, the U.S. Navy supplied seawater from oceans all over the world. Railroad tank cars delivered seawater to Cincinnati, which was sprayed at various controlled rates onto test plots.

In 1940, four 12-foot peach trees were planted 20 feet apart. Two of them, designated experimental, were treated with 600 cc. of seawater per square foot, before the buds broke; the other two acted as controls, receiving no application.

Murray recalled: "All four trees were sprayed with Curly Leaf virus. The test lasted three years. Virus spraying took place only the first year. Control trees contracted Curly Leaf each year, and finally died. Experimentals retained resistance throughout, and provided normal yields each year."

Turnips were planted the same year, the experimental half fertilized with 600 cc. of seawater per square foot of soil. Staphylococcus bacteria associated with "center rot" was mixed into the soil of the entire plot. When turnips sprouted and leaves appeared, they were sprayed with the bacteria. All experimentals grew normal, healthy, no evidence of center rot. Controls contracted center rot and died. Similar results occurred with every crop Murray tested.

SEA SOLIDS

All the solids in one railroad tank car of seawater hardly fill a steel drum. By weight, 3.5 percent of seawater is made up of solids. Seawater is cheap, but water is heavy and thus costly to transport, so Murray began using sea solids: salts and other chemicals. Eliminating the water so that only the solids remained made transport economical, and solids were easier to apply to soils.

He wrote, "We looked worldwide for natural locations where seawater becomes landlocked, and total evaporation takes place. . . . This complete spectrum of elements from the sea we designated sea solids."

Rain falling on sea salts drying in open-air beds dissolves heavier metals and trace elements first. Minerals that go in solution quickest wash away faster than light minerals. After a few rainwater washings, sea salt has far more sodium, and far fewer trace elements. Murray searched for sources of sea sediments that were subject to minimal rainfall and leaching. Southwest Africa; Arabia; Baja, California; and northern Chile are all arid areas where rain is rare. There, ocean waters swell up at high tides into beachside lagoons. These pools dry out, leaving behind the minerals. Murray believed that these desert deposits retained all of seawater's original elements in nearly the same ratios.

Over the course of more than 20 years, Murray tested sea solids on various crops in seven states and in different climates. Experiments indicated that land plants tolerate 400 to 1000 cc. of seawater to 1/3 cubic foot of soil. Sea solids were administered to soil at 500 to as much as 3,000 pounds per acre. Excepting cases of serious rainwater runoff, one application would last five years.

Corn, wheat, oats, barley, hay, fruit trees, vegetable crops and other plants were raised using seawater or sea solids. Fields were planted so that an experimental plot using sea solids (applied at 1,000 to 2,200 pounds per acre) was situated beside a control plot using the best commercial method. Crops fertilized with sea solids grew faster, were healthier, and produced far greater growth. Resulting color, disease resistance, taste and yield were outstanding.

Animals, wild and domestic, had no trouble determining which crop was better to eat. A walk through one of the fields fertilized with sea solids revealed a glimpse of animal heaven. Rabbits and mice scurried everywhere, yet a control area with standard fertilizers was almost lifeless.

In the 1950s, Murray began assaying crops for nutrients. Consistently, foods grown using sea solids had significantly more minerals (ash content), vitamins (25 percent more vitamin C in tomatoes; 40 percent more vitamin A in carrots) and sugars.

PRINCIPLE OF PROPORTION

"From the start," Murray recorded, "my sea solids experiments produced excellent results. It conclusively proves the proportions of trace minerals and elements present in sea water are optimum for growth and health of both land and sea life."

Growers quickly criticize Murray, insisting that salt will kill plants as quick as any pesticide or poison. This is true of table salt, but Murray found that if sodium is blended with all of the other elements in the same ratios as in seawater, plants aren't injured — instead, they thrive.

Murray learned a key principle: each essential element must be present in certain precise proportions relative to the others.

"Tomatoes serve as example of this need for balance," he explained, "Tomato growers know potassium has a major function in plant growth. Potassium is added to soil in quantity by growers. Yet the tomato itself has only a minor amount of potassium.

"My experiments proved conclusively a small amount of potassium, as in its proper balance in seawater, grows unusually healthy, outstanding tomatoes. It's unnecessary to fertilize heavily with one element if an adequate balance of elements is available."

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ACRES USA
A VOICE FOR ECO-AGRICULTURE
November 2001 - Vol. 31, No. 11- Page 1

To evaluate qualitative effects, the total amount of minerals is less critical than the proper ratios among them. Individually, one mineral in excess can be toxic and make other elements seem to be in deficit. Blended in balance with all the elements in seawater, they enhance and enliven each other.

TRACE ELEMENTS: LEAST AS MOST

In Murray's time, knowledge of trace elements was minimal. Only twenty elements were known to have specific roles in human physiology. Several more were known to benefit plants and animals. Heavy metals were suspected of positive roles. Even poisonous elements (e.g., arsenic) were beneficial if ingested in organic form, and in trace amounts. Only nine trace elements were listed in "Recommended Dietary Allowances," and few enzymes had their trace elements identified, yet thousands of enzymes were identified. Undoubtedly, many more enzyme and trace element functions remain to be described.

So, while Murray could write little on trace elements, he grasped how the least can exert the most influence. An element needed in micrograms or less can have dramatic biologic effects by activating enzymes and hormones. Murray knew that we need all of the elements available, not a few in excess amounts.

SEAPONICS

Murray realized that farmland is a limited resource and came to believe that hydroponics was humanity's best bet to expand food production. He began experiments with this method in his cellar to supply his family with year-round fresh produce. Later, he collaborated in this research with commercial-scale growers. In 1958, he bought a Florida farm and became a commercial grower, with 178 beds, each 100 feet by 4 feet.

About 112 pounds of dried, natural sea solids were dissolved in up to 10,000 gallons of water. The only fertilizer that experimental crops received was this solution of sea solids (and sometimes nitrogen), which bathed their roots a few times each day.

In a typical test, tomatoes were planted a foot apart in 3-foot by 100-foot hydroponic beds. The beds were flooded with the nutrient solution, which was then drawn out and returned to a tank three times a day. Experimental beds received 112 pounds of sea solids to 5,000 gallons of water; controls received conventional hydroponic solution.

Tobacco Mosaic Virus, lethal to tomatoes, was sprayed on all plants. Experimentals didn't contract the disease, while all the controls died. In trial after trial, sea solids seemed to confer greatly enhanced disease resistance — near immunity.

Murray asserted, "All essential nutrients can be supplied in proper proportions by a single dilute solution of seawater, plus nitrogen. Dissolving complete sea solids in fresh water formed dilute solutions of 1,000 to 8,000 parts per million."

Eventually, he operated a successful five-acre hyroponic farm in south Florida, growing tomatoes, lettuce, cucumbers, celery and other produce in intensive beds. Because he grew superior yielding crops of healthy, tasty, disease-free plants, market demand for his crops was high, and his farm very profitable.

"My experiments proved adequate supplies of food can be developed if man recycles the sea," insisted Murray.

ANIMAL TESTING

Murray's most remarkable tests were trials feeding animals with foods grown using sea solids. Cattle feeding behavior provoked his excitement. Corn grown on this fertilized soil was marked by wrapping tape around a stalk, which was then mixed with conventional cornstalks and dumped in a pasture.

Astonished, Murray recalled, "As animals munched away, immediately they preferred sea-solid stalks. After once sampling an experimental stalk, animals would nuzzle and burrow the pile to find another, ignoring control stalks until they had no other choice."

In further proof that animal instinct knows best, Murray treated a 100-square-foot section of clover with sea solids. When the clover was 6 inches tall, sheep were allowed to graze. They walked and grazed until they came to the treated spot, then ate until the clover within the treated area was nubbed to the ground.

Results urged larger, elaborate study of animal feeding. Murray designed a series of trials with various feed grains and types of animals. Working with several farmers, he devoted years to studying the benefits of sea solid-fertilized feeds.

He reported, "In 1954, three staple feeds — corn, oats and soybeans — were grown, and subsequently fed to animals under controlled conditions: four parts corn, two oats, one soy. Not only were experimental crops superior, but effects on animal physiology and pathology were delightfully amazing."

Feeding experiments with cattle showed greater weight-gain after eating less experimental feed. Chickens were particularly partial to sea solid-grown feeds; they grew more quickly, hens produced more and larger eggs sooner, and at slaughter their meat was of better quality.

Murray wrote, "Chickens, pigs and cattle fed sea solids produce reached maturity sooner than controls, and resisted diseases common to their species better. Experimental pigs carried benefits into a second generation; there were no runts in litters."

CANCER: NUTRITION OR GENES?

Murray's most astonishing tests were with lab mice: "A first animal experiment was on C3H mice, which get spontaneous cancer of the breast. We hoped sea solids-grown food could build resistance to the virus or cancer.

"C3H mice were divided in two groups. Controls were fed regular cereal grain, while experimentals were fed cereal grain raised on sea solids-treated soil.

"Instead of cancer in 90 percent of controls, experimental animals' rate dropped to 55 percent. Second generations born to parents fed sea solids food had cancer in only 2 percent of the population!"

This single experiment caused Murray to reconsider the conventional causes attributed to this dread disease. He repeated his experiment in variations. Each time, sea solid-fertilized feed seemed to impart resistance, perhaps immunity, to cancer.

NUTRITION-DEFICIENCY DISEASES

Murray faced facts compiled in experiment after experiment, and realized that nutrient deficiencies are a key element contributing to degenerative diseases: "My research clearly indicates Americans lack complete physiological chemistry because balanced, essential elements of soil have eroded to the sea; consequently, crops are nutritionally poor, and animals eating these plants are, therefore, nutritionally poor.

"Minerals have departed from our soils due to continuous taking of crops and erosion. Most crops require forty elements from the soil. In no case do fertilizers add

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ACRES USA
A VOICE FOR ECO-AGRICULTURE
November 2001 - Vol. 31, No. 11- Page 1

more than twelve, most add six."

Unlike technicians who see only their own small problem, Murray's lifelong work with oceans, farmers, hydroponics and medicine gave him a broad view. He recognized that a new pill won't resolve the real problem. Only addressing the root source can relieve disease. Murray correctly saw agriculture as the real root cause, and called for changes, not in medicine, but in farming and food processing.

SEA ENERGY AGRICULTURE

In 1976, Murray published a small book titled Sea Energy Agriculture — a remarkable testimony to a natural approach to soil fertility, and a nutritional approach to medicine. Murray wrote hopefully, believing he had important news to report: "This is my lifelong search to open doors to a provocative new arena of science and technology called sea energy agriculture. . . . Quite possibly this could lead to the end of disease and famine."

Murray's one chapter on organic farming reveals weak insight into ecology — a prevalent shortcoming in his day. He believed that plants feed directly on inorganic ions in watery soil solution — no matter whether a nutrient was natural (organic) or man-made (synthetic).

The physician knew little of how bacteria, fungi and microbes affect plant feeding — that roots and soil organisms form intimate communities, wedded together in tight symbiotic dependencies. Actually, the medical doctor saw microbes mostly as unfriendly and dangerous.

Nonetheless, Murray's conclusion states: "Today's organic farmers realize a giant commercial farmer, specializing in one crop, using only chemical fertilizer, is destroying soil's ability to produce food. If this continues, soil will be ruined and lost through erosion. To prevent this, and reclaim soil already destroyed, organic farming must be used."

Thus, Murray cast his lot with the tiny minority to challenge the chemical orthodoxy of his times. Like every other small voice of reason, he was ignored in the petrochemical rush to pump up yield with synthetics.

Murray's conclusion also states, "Research reported is in the nature of pilot projects. Tremendous further research needs to be done to render conclusive the appealing results and provocative trends indicated to date."

The book ends with Murray musing on the human implications of his findings. He cautioned against extrapolating his observations into human nutrition and health, yet recognized it to be a key issue of our time — a key to renewing America's soil, food and health:

"For man to continue to live on earth, he must make fundamental changes. He must look to oceans as a source of needed elements. These elements must be returned to soil so better quality, more healthful foods can be produced.

"Man must stop destroying soil. This requires basic changes in our agricultural system. Large commercial farms probably must be broken up and small regional farms using organic methods take their place.

"We have the means and ability to make these changes. We need now only the desire."

Yet, Murray's voice fell on deaf ears. The narrow chemical mindset of his time couldn't embrace views differing from dominant paradigms. His data on nutrition and disease, soil minerals and food quality, and trace elements and health were lost, his warning to renew all the minerals needed in topsoil, ignored.

Dr. Maynard Murray was fond of saying, "Nature can teach us so much, if we would only listen." He died in 1984, not sure whether his message had been heard or understood.

A quarter of a century has passed since Sea Energy Agriculture was published. Perhaps the time has arrived for the insights of this 20th century bioneer to be recognized and put to proper use. Certainly the need has never been greater.

For more information about Dr. Maynard Murray, including excerpts from Sea Energy Agriculture, visit the website <www.championtrees.org/topsoil/seaponics.htm>