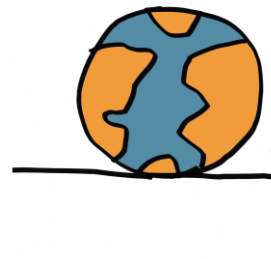


SEIZING AN ALTERNATIVE

Toward an Ecological Civilization

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Plenary address: Vandana Shiva



Soil, Papered Over

The rhetoric for taking over food systems and seed supply is always based on 'improved seed'. But industrial seeds are only 'improved' in the context of higher dependence on chemicals, and more control by corporations

Science” is derived from the word scire — “to know”. Each of us should know what we are eating, how it was produced and what impact it will have on our health.

The knowledge we need for growing food is the knowledge of biodiversity and living seed, of living soil and the soil food web, of interaction between different species in the agro-ecosystem and of different seasons. Farmers have been the experts in these fields, as have ecological scientists who study the evolution of micro-organisms, plants and animals, the ecological web and the soil food web. In industrial agriculture, the knowledge of living systems is totally missing, since industrial agriculture was externally driven by using war chemicals as inputs. Soil was defined as an empty container for holding synthetic fertilisers and plants were defined as machines running on external inputs. This meant substituting the ecological functions and services that nature and farmers can provide through renewal of soil fertility, pest and weed control, and seed improvement. But it also implied ignorance of the destruction of the functions by the toxic chemicals applied to agriculture.

This complex knowledge of interacting, self-organising, self-maintaining, self-renewing and self-evolving systems that farmers have had is now being confirmed through the latest in ecology. At the agricultural systems level, agro-ecology, not the mechanistic and blind paradigm of industrial agriculture is the truly scientific approach to food production.

At the level of organisms, epigenetics and the new knowledge that cells are in constant communication with each other is leading to the emergence of a new paradigm of life as communication and intelligence. Living systems are not dead matter, assembled like a machine.

Yet, in recent times, only one kind of knowledge, the mechanistic reductionist paradigm, based on seeing the world as a machine and reduction of a system its parts, has been elevated to the status of science.

The emerging sciences of complexity and connectedness expose the oceans of ignorance in which the mechanistic fundamentalism is steeped. Because living systems are not machines, they are a self-organised complexity, knowledge of a small, fragmented part in isolation of its relationships with the rest of the system translates into not knowing.

This epistemic violence is now being combined with the violence of corporate interests to viciously attack all scientific traditions, including those that have evolved from within Western science and transcended the mechanistic worldview.

It is actually becoming anti-science.

Nowhere is this more evident than in how reductionism has been used to colonise the seed. Seed is self-organised intelligence — it reproduces, it multiplies, it constantly evolves. Farmers, especially women, have combined their intelligence with the intelligence of the seed, and through breeding as co-creation they have domesticated wild plants, increased diversity to adapt to diverse climates and cultures, they have improved nutrition and taste, they have increased resilience, which is the evolutionary potential of the seed. Seeds have been improved on the basis of ecological and social criteria.

The rhetoric for taking over food systems and seed supply is always based on “improved seed”. But what is not mentioned is that industrial seeds are only “improved” in the context of higher dependence on chemicals, and more control by corporations.

The latest in the anti-scientific discourse of industrial agriculture is about reducing everything to genetically modified organisms (GMOs).

Genetic engineering is used to redefine seed as a corporate “invention” to claim patents and collect royalties. Farmers’ suicides in the cotton belt of India are directly related to the extraction of super-profits from farmers as royalty. And this is illegal since Monsanto never had a patent on Bt cotton.

It is claimed the GMOs will increase food production but the technology does not increase yields.

It is claimed that genetic engineering is a precise technology. This is false for four reasons.

First, genetic engineering is based on the false assumption that one gene gives rise to one trait.

Second, it is so imprecise that antibiotic-resistance-marker genes have to be added to even know if the gene was actually introduced in the cell of the plant and genes from virulent viruses have to be added to promote the trait being introduced.

Third, because the genes come from unrelated organisms and include bacterial and viral genes, there are unknown impacts on the organism and the ecosystem in which it is introduced. This is why there are multidisciplinary sciences involved in biosafety, and an international UN law to regulate GMOs for their biosafety impact, called the Cartagena protocol to the Convention on the Conservation of Biodiversity.

Fourth, the anti-scientific claim that GMOs are accurate and selection and conventional breeding are inaccurate ignores the intelligence of plants and of farmers which is at play in evolution.

In fact, the emergence of antibiotic resistance indicates the intelligence of bacteria to evolve under the pressure of antibiotics. Bacteria, as intelligent beings, are remaking themselves in response to antibiotics. The emergence of superpests resistant to Bt. toxin in plants, and superweeds resistant to Roundup with the spread of Roundup Ready GMOs indicates the intelligence of insects and plants to remake themselves under the pressure of toxins associated with GMOs which are designed to kill them. But it is precisely on the denial of intelligence of humans and other species that the edifice of mechanistic reductionism is based.

“Intelligence” is based on the Latin word *inter legere* which means “to choose”. From the slime mould and bacteria, to plants and animals, including humans, intelligence is the choice we make in order to respond to changing contexts. Life is a cognitive system with communication constantly taking place in a network on non-separable patterns of relationship. Living beings innovate all the time to deal with environmental challenges that face them. As American evolutionary biologist Richard Lewontin says, “The characteristic of a living object is that it reacts to external stimuli rather than being passively propelled by them. An organism’s life is constant midcourse corrections.”

Humans as a species, are falling behind slime mould and bacteria to make an intelligent response to the environmental threats we face. And our intelligence is being thwarted by the false construction of the living Earth as dead matter, to be exploited limitlessly for human control, domination and greed.

The mid-course correction we need is to move beyond the mechanistic paradigm, and beyond exploitation which is manipulating not just living organisms, but knowledge itself.

It is claimed that the Bt toxin in GMOs degrades, but it has been found to survive in the blood of pregnant women and fetuses. It is claimed that Round-up and Round-up ready crops are safe for humans because humans do not have the shikimate pathway — a seven step metabolic route used by bacteria, fungi, algae, parasites and plants for the biosynthesis of aromatic amino acids.

This is outright violence against science. Ninety per cent of the genetic information in our body is not human but bacterial. Out of the 600 trillion cells in our body only six trillion are human, the rest are bacterial. And bacteria have the shikimate pathway. The bacteria in our gut are being killed by Round-up leading to serious disease epidemics, from increasing intestinal disorders to neurological problems such as the increase in occurrence of autism and Alzheimer's.

The US Centre for Disease Control data shows that on current trends one in two children in the US will be autistic in a few decades. It is not an intelligent species that destroys its own future because of a distorted and manipulated definition of science.

As Einstein had observed, "Two things are infinite: the universe and human stupidity and I'm not sure about the universe."

This piece is reprinted from The Asian Age and is based on Dr. Shiva's presentation at the SEIZING AN ALTERNATIVE conference on the mis-use of science.