Simplify or complexify? Food for thoughts on innovation in agriculture

What is easier to conceive, plan and build? A robot who can manage one type of movement (let’s say, move forward), or one that can fulfill several tasks? One that does one task at the time or one that can do several ones in a coordinate manner? What is easier to control: a single precise movement or several to be coordinated? Moving a thumb on a screen or cutting vegetables while feeding a baby and reading the news? You got the idea, simplifying makes control easier, few means more controllable.

And controllable means more reliable and more secure…. Or not?

Now, on the other hand: Do you stand on one foot when you take the bus? Is a narrow bar chair more or less likely to fall over than a large armchair if bumped into? Do you stand straight with feet close together when you are on a moving ship? Don’t you suddenly use your hands and arms to support your body weight when you fall over, although this is your legs’ job? Right, to ensure stability in a moving environment or return to normal (resilience) after a suddenly changing situation, more points of reliability, more coordinated actions are necessary. In this perspective, resilience means flexibility … and more complexity.

To transfer these trivial, daily life experiences to agriculture: it seems that modern agriculture has followed the path of optimized control by simplifying, separating actions, separating species, following a chain dynamic from the seed to the plate. A smooth, linear process is favored by a high degree of order and regularity. Mechanization, digitalization are technologies that can optimize this process to a high efficiency and speed. Large monocultures with large machines, standardized procedures and optimized high productive clones of crops and animals have thus become the norm in modern agriculture. No-soil cultivation, automated vertical farms, genetic engineering or similar, are innovations which are well integrated in this logic.

However, what happens to a system relying on few clones, few varieties, planted repeatedly, identically on a huge surface? When one link breaks in the chain from the seed to the plate? Water needs, pests, extreme weather events, are only few factors that are likely to disrupt the chain.

In a world where so much is changing and many aspects are sometimes unpredictable or outside of our means of influence, shall we not rather risk the path of less control-driven innovation, by favoring a long-term stability and resilience-driven conception?

Can agriculture change from a chain to a network? In a biomimicry perspective, conceiving agriculture as an ecosystem and using the strengths given by benefic interactions can give the stability that a chain conceived process cannot give. After all, all known life forms, at different degrees, are complex – and flexible from the very beginning: their DNA itself is made for endless recombination. By choosing not to control every disruptive element, as wild animal life, parallel plant life, border cultivation as hedges, to name a few, but by using their dynamics as an advantage, it is possible to build a more resilient system. Biocontrol with natural predators, symbiotic nitrogen fixers, erosion control, protective canopy, are just a few of these interactions; they add complexity – and disrupt the safety-inspiring order and control- but provide the extra support in case of change of the original, predicable situation. The elaboration of methods using intercropping or agroforestry, symbiotic interactions, with technologies and techniques developed in this optic, is another approach to innovation for agriculture.

Paradoxically, can the choice for a bit more complexity improve our control, not on single processes, but on the overall outcome of the production?