

# Human Microbiota, Functional Biodiversity and Agroecological Designs: In Search of a Healthy Diet



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## Opinion

The modern diet is vastly different from that of our Paleolithic ancestors, who had an annual base of some 500 different plants, whereas ours has fewer than 50; they ate their food raw and often fermented, while we preserve, dry and cook our food, processes known to destroy many sensitive nutrients and antioxidants. This may be the reason why we are now seeing an increase in various atopic diseases, infections and so-called Western diseases [1].

The intestinal ecosystem is a complex environment in which dynamic and reciprocal interactions occur between the epithelium, the immune system and the local microbiota [2]. Likewise, the concept of a nutrient as any assimilable substance contained in food, which allows the body to obtain energy, build and repair tissues and regulate metabolic processes, has passed to that of an immunonutrient, which is a substance that, unlike a nutrient conventional, is capable of enhancing the immune system [3].

Given this need, agroecology emerges as a discipline that provides the basic ecological principles on how to study, design, and manage agroecosystems that are both productive and conserving natural resources, and that are also culturally sensitive and socioeconomically viable [4].

Because agroecosystems are dynamic and subject to different types of management, crop arrangements in time and space are continually changing, according to biological, socioeconomic, and environmental factors, variations in the landscape that determine the degree of characteristic heterogeneity of each agricultural region, which in turn conditions the type of biodiversity present [5]; because in every agroecosystem there is a set of interactions between the elements of biodiversity that compose it, which largely determine the health of the system [6].

The need to address the study of biodiversity from a more systemic perspective led to the emergence of the concept of functional diversity [7], which has been gaining more and more popularity among the scientific community, given its close links with ecological processes. Therefore, attention is currently turning to a more functional approach, which tries to establish causal relationships between the characteristics of the organisms present and the processes and services of the ecosystems [8].

When these interactions are achieved in the design of farms and their management, then it can be said that the complexity of said system has been reached, since biodiversity functional is favoring the different organisms to act for the benefit of agricultural production, by having the mechanisms that allow increasing the regulation of populations of harmful organisms, pollination, nutrient recycling, crop nutrition, among other ecosystem services [9].

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In fact, the feeding of human populations has gone from the collection of fresh vegetables in nature, to specialized production in large monoculture extensions, with high mechanization and use of agrochemicals; that is, from natural foods to those manipulated through different technological processes. The latter have become a few basic products, whose negative effects are well known, due to prolonged exposure over many generations to a low diversity of foods and their associated microbiota, which is why nutrition and immunity functions have been reduced naturally in the human microbiota.

In the future, food will not only allow optimal growth and development from pregnancy and in all stages of life, but will also enhance physical and mental capacities, as well as reduce the risk of disease [10], because billions of microorganisms inhabit the human body and influence its development, physiology, immunity, and nutrition [1].

In the search for a healthy diet, the redesign of food production systems under the principles of Agroecology, facilitates the functional interactions of biodiversity that contribute to its capacity for ecological self-regulation and that of the intestinal ecosystem of the people who consume said foods.

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