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АГРОЕКОЛОГІЯ ЯК СТІЙКА СИСТЕМА ДОВКІЛЛЯ

Агроекологія є науковою дисципліною, яка прагне забезпечити об'єктивну, екологічно обґрунтовані оцінки структури, функції, багатовимірності і просторовий масштаб системи живлення. Вчені та педагоги вже давно боровся зі складністю вивчення сільськогосподарських і продовольчих систем. Агроекологія є складна наука, один, який пов'язує екологічні, економічні, соціальні, етичні та правові аспекти виробництва продуктів харчування.

Ключові слова: *агроекологія, системи живлення, продуктів харчування.*

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АГРОЭКОЛОГИЯ КАК УСТОЙЧИВАЯ СИСТЕМА ОКРУЖАЮЩЕЙ СРЕДЕ

Агроэкология является научной дисциплиной, которая стремится обеспечить объективную, экологически обоснованные оценки структуры, функции, многомерности и пространственный масштаб системы питания. Ученые и педагоги уже давно боролся со сложностью изучения сельскохозяйственных и продовольственных систем. Агроэкология является сложная наука, один, который связывает экологические, экономические, социальные, этические и правовые аспекты производства продуктов питания.

Ключевые слова: *агроэкология, системы питания, продуктов питания.*

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AGROECOLOGY AS A SUSTAINABLE SYSTEM IN OUR ENVIRONMENT

Abstract. *Agroecology is a scientific discipline that seeks to provide an objective, ecologically based assessment of the structure, function, multidimensionality, and spatial scale of food systems. Scientists and educators have long struggled with the complexity of learning about agricultural and food systems. Agroecology is a complex science, one that links the ecological, economic, social, ethical, and legal aspects of food production.*

Keywords: *agroecology, food systems, food production.*

Agroecosystems Analysis, Agronomy Monograph Number 43, provides practical and scientifically based guidelines as well as specific indicators of agroecosystem structure and function to help students and professionals unravel this complexity. This perspective is important to promote better understanding of the flow of agro ecosystem functions from the physical structuring of the field, the farm, the landscape, and the region.

Agroecology. Most agricultural scientists and many of today's courses in current curricula focus on the production aspects of agriculture. The goals of increased crop yields and animal production are inherent and assumed in the design of cropping, grazing, and crop Banimal systems. Yet we know that sustainability of agriculture and food systems will depend on more than production. For this reason, the indicators used to assess systems in the following chapters reflect biological, ecological, economic, and social dimensions of agroecosystem. The science of agroecology has developed as a framework within which we can objectively measure and evaluate food and fiber systems.

This monograph provides an excellent overview of the current state of the science of agro ecology. Leaders in this field give detailed analyses of key topics such as multidimensional thinking, multifunctional economic analysis, whole-farm planning, and agricultural conservation at the landscape scale, agroecosystem functions that benefit society, and ecological morality. A critical analysis of our current approach in designing agricultural research, teaching, and funding programs is provided, followed by an alternative vision of how we should redesign these programs in more holistic, sustainable manners. Research and education priorities, suggested across a spectrum of spatial scales for the full breadth of key topics in agroecology, will be valuable guidance for farmers, researchers, teachers, students, and policymakers.

Sustainable factor in agroecology. With all of the environmental and social problems confronting our food systems today, it is apparent that none of the strategies we have relied on in the past? Higher-yielding varieties, increased irrigation, inorganic fertilizers, pest damage reduction? Can be counted on to come to the rescue. In fact, these solutions are now part of the problem. It is becoming quite clear that the only way to keep the food crisis from escalating is to promote the conversion processes that will move agriculture to sustainability.

The Earth's population is set to increase to 9 billion by 2050. If we continue to act as we do today, by this time the demand for resources will be three times greater than the planet can supply. This means change needs to happen.

Consumers and retailers are increasingly looking for more sustainable products. This means efficiency and sustainability are key – as we need to produce more with less. To remain competitive, brand owners and manufacturers must keep pace. SET makes sustainability measurable and identifies opportunities for enhancing product sustainability across the entire value chain. This creates an additional value dimension for consumers, brands and our customers' businesses: applied sustainability.

Animal nutrition. The global demand for animal protein is steadily rising. More and more people across all cultures and regions are able to afford animal protein in the form of meat, eggs and dairy products. By 2050, we will need to provide nutritious food for about 9 billion people. This major task will have an impact on the upstream food industry. So it should come as no surprise that sustainability is a topic of growing relevance in the animal nutrition industry. If we can make animal nutrition more efficient, cost-effective and sustainable, this will have a substantial knock-on impact on food products such as meat and dairy.

To maximize the potential of sustainability for your business, you need to zero in on the right issues. Be it greenhouse gases, animal welfare, energy consumption, acidification potential, water pollution or transparency – By helping you identifying which areas can most positively impact your product sustainability. Then, by addressing these hot topic sand by providing tangible solutions. Perhaps a feed mix that reduces the CO^2 footprint of meat might be the answer; or higher feed conversion rates; or a greater focus on animal welfare. No matter what method you deploy, enhanced sustainability adds tangible value to the entire feed and food chain.

Human nitrition. Food, beverages and dietary supplements are consumer products that respond very quickly to market trends and consumer preferences. Taste, effectiveness and convenience are important attributes that help to differentiate. By enables players in the human nutrition industry to turn sustainability into an additional product attribute. In a time when the industry is facing stricter legislation, increasingly tough approval standards imposed by international retailers and the need for greater traceability and we turns these challenges into opportunities.

We help you find out which sustainability topics matter most to the market, stakeholders and consumers. For example, issues like water use and packaging waste might be perceived as critical when it comes to beverage production. For the value chain of dietary supplements, the identified topics might be air pollution and packaging waste. Having identified the market-relevant sustainability topics and by evaluating how to optimize and position the product. As the next step and by integrating the results into your product positioning – giving your brand a valuable competitive advantage.

Pharmaceutical. Pharmaceutical companies are well versed in the challenges of spearheading innovation and ensuring rapid time-to-market. Sustainability, on the other hand, is a relatively new issue in the pharmaceutical sector – but one which is growing in importance, offering additional opportunities to create value.

By opening up new horizons for differentiating your products – essential in an industry where the highest standards and state-of-the-art production technologies are the norm. What's more, improving sustainability can offer a host of knock-on benefits for your business, such as reducing processing costs, minimizing product impurities, or introducing high-quality materials that are easy to handle.

Applying agroecological concepts to the development of Ecologically Pest Management strategies – Pest management strategies in agro ecological concepts:

1) Most of the scientist today would agree that conventional modern agriculture faces an environmental crisis. Land degradation, salinization, pesticide pollution of soil, water and food chains, depletion of ground water, genetic homogeneity and associated vulnerability, all raise serious questions regarding the sustainability of modern agriculture.

2) The causes of environmental crisis rooted in a prevalent socioeconomic system which promotes monocultures and the use of high input technologies and agricultural practices that lead to natural resource degradation. Such degradation is not only an ecological process, but also a social and political-economic process. This is why the problem of agricultural production cannot be regarded only as technological, but while agreeing that productivity issues represent part of the problem, attention to social, cultural and economic issues that account for the crisis is crucial.

3) The loss of yields due to pests in many crops, despite the substantial increase in

the use of pesticides is a symptom of the environmental crisis affecting agriculture. It is well known that cultivated plants grown in genetically homogeneous monocultures do not possess the necessary ecological defense mechanisms to tolerate the out breaking of pest populations. Modern agriculturists have selected crops for high yields and high palatability, making them more susceptible to pests by sacrificing natural resistance for productivity. On the other hand, modern agricultural practices negatively affect pests' natural enemies, which in turn do not find the necessary environmental resources and opportunities in monocultures to effectively and biologically suppress pests. Thus while the structure of the monocultures is maintained as the structural base of agricultural systems, pest problems will continue to be the result of a negative treadmill that reinforces itself. Thus the major challenge for those advocating Ecologically Based Pest Management (EBPM) is to find strategies to overcome the ecological limits impede by monoculture.

4) Integrated pest management (IPM) approaches have not addressed the ecological causes of the environmental problems in modern agriculture which are deeply rooted in the monoculture structure prevalent in large scale production systems. There still prevails a narrow view that specific causes affect productivity, and overcoming the limiting factor (i.e. insect pest) via new technologies, continues to be the main goal. In many IPM projects the main focus has been to substitute less noxious inputs for the agrochemicals that are blamed for so many of the problems associated with conventional agriculture. Emphasis is now placed on purchased biological inputs such as Bacillus thuringiensis, a microbial pesticide that is now widely applied in place of chemical insecticide. This type of technology pertains to a dominant technical approach called input substitution. The thrust is highly technological, with the limiting factor mentality that has driven conventional agricultural research in the past. Agronomists and other agricultural scientists have for generations been taught the "law of the minimum" as a central dogma. According to this dogma, at any given moment there is a single factor limiting yield increases and that factor can be overcome with an appropriate external input. Once the hurdle of the first limiting factor has been surpassed-nitrogen deficiency, for example, with urea as the correct input-then yields may rise until other factor-pests, say-becomes limiting in turn due to increase levels of free nitrogen in the foliage. That factor then requires another input-pesticide in this case-and so on, perpetuating a process of treating symptoms rather than the real causes that evoked the ecological unbalance.

5) Emerging biotechnological approaches do not differ as they are being pursued to patch up the problems (e.g. pesticide resistance, pollution, soil degradation, etc.) caused by previous agrochemical technologies promoted by the same companies now leading the bio-revolution. Transgenic crops developed for pest control closely follow the paradigm of using single control mechanism (a pesticide) that has proven to fail over and over again with insects, pathogens and weeds (National Research Council, 1996). Transgenic crops are likely to increase the use of pesticides and to accelerate the evolution of 'super weeds' and resistant insect pests (Rissler and Mellon, 1996).

6) The 'one gene-one pest' approach has proven to be easily overcome by pests that are continuously adapting to new situations and evolving detoxification mechanisms (Robinson, 1996). There are many unanswered ecological questions regarding the impact of the release of transgenic plants and microorganisms into the environment. Among the major environmental risks associated with genetically engineered plants are the

unintended transfer to plant relatives of the 'transgenes' and the unpredictable ecological effects (Rissler and Mellon, 1996).

7) Given the above considerations, agro-ecological theory predicts that biotechnology will exacerbate the problems of conventional agriculture. By promoting monocultures it will also under-mine ecological methods of farming, such as rotations and polycultures (Hindmarsh, 1991). As presently conceived, biotechnology does not fit into the broad ideals of sustainable agriculture (Kloppenburg and Burrows, 1996).

8) This view has diverted agriculturists from realizing that limiting factors only represent symptoms of a more systematic disease inherent to unbalances within the agroecosystem and from an appreciation of the context and complexity of agroecological processes thus underestimating the root causes of agricultural limitations. A useful framework to accomplish this is to use agroecological principles.

Conclusions. Agroecology goes beyond a one-dimensional view of agroecosystem-their genetics, agronomy, edaphology- to embrace and understanding of ecological and social levels of coevolution, structure, and function. For agroecologists, sustainable yield in the agroecosystem derives from the proper balance of crops, soils, nutrients, sunlight, moisture, and other coexisting organisms. The agroecosystem is productive and healthy when these balanced and rich growing conditions prevail and when crop plants remain resillient to tolerate stress and adversity. Occasional disturbances can be overcome by a vigorous agroecosystem which is adaptable and diverse enough to recover once the stress has passed. Occasionally strong measures (i.e. botanical insecticides, alternative fertilizers, etc.) may need to be applied by farmers employing alternative methods to control specific pests or soil problems. Agroecology provides the guidelines to carefully manage agroecosystem without unnecessary or irreparable damage. Simultaneous with the struggle to fight pests, diseases, or soil deficiency, the agroecologists strives to restore the resiliency and strength of the agroecosystem. If the cause of disease, pests' soil degradation, and so forth, is understood as imbalance, then the goal of the agroecological treatment is to recover balance. In agroecology, biodiversification is the primary technique to evoke self regulation and sustainability.

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