

Time to Improve Agriculture Techniques

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| ABSTRACT   |  |  | | --- | --- | | India is the land of agriculture and it is the second largest country in the world where more than 60% population depends on agriculture. Agriculture doesn’t mean only sapling of seeds, harvesting of the crops, storing of the grains and others too. It means cultivation of crops with new techniques to improve the quality rate, more production and most importantly within the time interval of the crops. Farmers mostly depend on the weather and cultivate them according to it. But always it’s not really happen with them due to drought, flood, forest fire and any other calamity. If they know any natural calamity has come, then they would prepare themselves from very big loss. So, we have to understand the current trends of agriculture that can save farmers life due to their crucial financial conditions. Genetically Modified crops and Agroecology [1] are the latest technological paradigms. Anyway, they are not successful right now but they become popularly used after they introduced with proper deterministic way. Then the result of these determinants constructs a technological regime.   |  | | --- | |  | | |

1. INTRODUCTION

Science and technology has changed the style of living so, it can also change the elegance of agriculture. Fundamental studies are applied to improve the techniques i.e. Agrophysics, agrology, agriculture soil science, agriculture philosophy, agriculture chemistry, biotechnology and genetics. These studies results in a constant flow of innovation and technical changes that are greatly influenced the agriculture systems. However, the movement in global footprint of agriculture, including its contribution to climate change (IPCC, 2007; millennium Ecosystem Assessment, 2005), while non- governmental organizations and scientists have long called for radical changes in this field (Union of Concerned Scientists, 1996; Food Ethic Council, 2004; European Science Social Forum Network, 2005). Yet now, a radical change has been recommended[8][9][12].

The International Assessment of Agriculture Science and Technology for Development has recently released the Panel on Climate Change. They concluded “Successfully meeting development and sustainability goals and responding to new priorities and changing circumstances would require a fundamental shift in agriculture knowledge, science and technology”[15][17].

In this paper, we try to improve by biological and agriculture science. Scientists and public can theoretically research on these extensions with equal persistence to develop new agriculture systems.

1. GENETIC ENGINEERING

Genetic Engineering plays a vital role in agriculture by introducing GM crops. GM is Genetically Modified Crops, the direct manipulation of an organism's [genome](http://en.wikipedia.org/wiki/Genome) using [biotechnology](http://en.wikipedia.org/wiki/Biotechnology). (Indirect genetic modification through [artificial selection](http://en.wikipedia.org/wiki/Artificial_selection) has been practiced for centuries.) New [DNA](http://en.wikipedia.org/wiki/DNA) may be inserted in the host genome by first isolating and copying the genetic material of interest using [molecular cloning](http://en.wikipedia.org/wiki/Molecular_cloning) methods to generate a DNA sequence, or by synthesizing the DNA, and then inserting this construct into the host organism[15].

GMO is to modify the quality of the produce, for instance, increasing the nutritional value or providing more industrially useful qualities or quantities of the produce.[[13]](http://en.wikipedia.org/wiki/Genetic_engineering#cite_note-Deborah_B._Whitman_2000-102) The [Amflora](http://en.wikipedia.org/wiki/Amflora" \o "Amflora) potato, for example, produces a more industrially useful blend of starches.

The genetic engineering of agricultural crops can increase the growth rates and resistance to different diseases caused by [pathogen s](http://en.wikipedia.org/wiki/Pathogen)and [parasites](http://en.wikipedia.org/wiki/Parasite).[[110]](http://en.wikipedia.org/wiki/Genetic_engineering#cite_note-Biodiversity-110)This is beneficial as it can greatly increase the production of food sources with the usage of fewer resources that would be required to host the world's growing populations. These modified crops would also reduce the usage of chemicals, such as [fertilizers](http://en.wikipedia.org/wiki/Fertilizer) and [pesticides](http://en.wikipedia.org/wiki/Pesticide), and therefore decrease the severity and frequency of the damages produced by chemical [pollution](http://en.wikipedia.org/wiki/Pollution)[7].

1. AGROECOLOGY

Agroecology is the study of ecological processes that operate in agricultural production systems. Bringing [ecological principles](http://en.wikipedia.org/wiki/Ecology#Fundamental_principles_of_ecology) to bear in [agroecosystems](http://en.wikipedia.org/wiki/Agroecosystem) can suggest novel management approaches that would not otherwise be considered. Agroecology emerged from the convergence of ecology and agronomy (Dalgaard et al., 2003)[3][4]. It is the application of the ecological science to the study, design and management of sustainable agroecosystems (Altieri, 1995). We use the term ‘agroecological engineering’ in this paper to put the two technological paradigms on an equal footing. ‘Agroecological engineering’ refers to the fact that agricultural systems can be ‘engineered’ by applying agroecological principles, just as plants are ‘engineered’ by transgenesis in ‘genetic engineering’. The term ‘Agroecological engineering’ has seldom been used, except occasionally in China (Yan and Zhang, 1993)[13][12].

Agroecological engineering is an umbrella concept for different agricultural practices and innovations such as biological control, cultivar mixtures, agroforestry systems, habitat management techniques (for instance, strip management or beetle banks around wheat fields), or natural systems agriculture aiming at perennial food-grain-producing systems. Crop rotations, soil fertility improvement practices, mixed crop and livestock management and intercropping are also included. Some applications involve cutting edge technologies while others are old practices (for instance, traditional systems that provide significant insights to agroecology). Globally, hundreds of agricultural systems are based on agroecological principles—from rice paddies in China to mechanized wheat systems in the USA, although data are not as accurate as for transgenic crops acreage (Parrott and Marsden, 2002; Pretty et al., 2003)[12][20].

1. SOURCES AND METHODOLOGY

The sources for the analysis of determinants of innovation are manifold:

• Interviews with scientists and stakeholders in five agrifood chains (wheat, apple, sugar beet, maize, soybean)

• Participant observation of public forums on agriculture, science and innovation

• An analysis of key policy documents such as white papers from public authorities

• A multidisciplinary literature review.

The analysis of the determinants of innovation uses (i) evidence and a few illustrative quotes from our surveys among stakeholders (ii) logical reasoning using results and conclusions from published research, and (iii) specific illustrative cases of transgenic plants and/or agroecological innovations.

Two assumptions are made. First, ‘agricultural research’ comprises agricultural as well as biological sciences. Secondly, genetic engineering is closely associated with molecular biology, the basic science on which it rests, even if molecular biology has other goals and is also related to agroecology.

Special attention is intentionally paid to the public sector and to the influence of determinants on agroecological engineering, a field much less explored than genetic engineering. Cultivar mixtures and agroforestry systems are used as examples of agroecological innovations that have already lived up to their reputation, while biological control has an intermediate status[12].

1. Assumption On Current And Future Systems

A common assumption made by scientists about the current modern agricultural systems is that they only require small adaptations. Problems such as pesticide risks are acknowledged, but the validity of the model in itself –monoculture, reliance on a high level of external inputs such as fossil fuels – is rarely questioned[12].

As for the future, scientists mainly think in terms of the *most probable* future agricultural systems, not the *most desirable* futuresystems, i.e. they seem to forecast future agricultural systemsby integrating the most probable economic and political trends.Asthese trends exacerbate economic pressures on farmers, the pursuitof input-intensive approaches is thought to be the most probableevolution. Many scientists frame their research around theseconstraints and behave as if global warming and the rising cost ofenergy did not demand major policy shifts (Kirschenmann, 2007)or as if there was no alternative to the mainstream economic trends(Patel, 2007)[19].

Genetic engineering fits into these expected trends: it does not entail many changes in current farming systems, such as monoculture. It only uses different types of seed, inputs (herbicides and insecticides) and management schemes and is thus seen as ‘potentially transferable’ to farmers. Innovations and systems closest to the principles of Agroecology face the opposite situation as they challenge the fundamentals of the current agricultural system, such as monoculture and crop protection relying mainly on external interventions. Many scientists do not explore these agroecological innovations because “*it goes* *against the flow*”, as a scientist explicitly stated during an interview, when asked why cultivar mixtures were not being researched to create systems resistant to fungal diseases. Scientists and stakeholders refer to current social and economic barriers impeding the use of some possible innovations by farmers today to justify the research deficit. Current barriers are seen as permanent immovable obstacles. As a result, some agroecological innovations are considered to be ‘theoretically valid’ but ‘not feasible’ in modern agricultural systems, as they ‘go against the flow’[22].

1. Assessment Of Agriculture Innovations

Scientific and methodological reductionisms also involve greater focus on the assessment of direct, local and short-term impacts, along with underestimation or neglect of the indirect, global or systemic and long-term impacts of agricultural systems and innovations.

Stress is easily laid on measurable variables such as gross yield rather than those variables that are much more complex to measure such as sustainability and externalities. This encourages scientists and innovators to focus on yield rather than economic optimum, on monocultures rather than multiple cropping systems[8][9][11].

Classic agricultural performance assessments are favorable to genetic engineering. The benefits of transgenic plants, usually grown in monocultures, are local and direct, and are consequently taken into account. On the contrary, classic performance measurements hinder agroecological engineering, particularly the sub trajectories with strong positive environmental or economic externalities. For instance, agroforestry systems are also carbon sinks, they help to improve soil fertility and biodiversity, while also bringing new revenues to farmers[12].

1. CONCLUSION

The concepts of technological paradigms and technological trajectories are useful to explain and analyze important trends in agricultural science and technology (S&T) at a time when fundamental shifts in agricultural S&T are increasingly recommended. Genetic and agroecological engineering (Agroecology), two of these trends, can be analyzed and compared with these concepts.

Our analysis contributes to strengthen the relevance of the evolutionary line of thought (evolutionary economics) against the neo-classical approach for agriculture-related issues.

The existence of path dependence and lock-in situations in agricultural research legitimizes public intervention. In other words, a global environment favorable to agroecology must be created if the recommendations of the IAASTD are to be implemented. This means not only a more balanced allocation of resources in agricultural research, but attention to the larger framework that influences S&T choices[15][23].

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