

Study Development of Biotechnology in Agriculture Section in Iran

Fariba Eghbalsefat Ronaghi

MSc in Agricultural Economics, Payame Noor University, Tehran, Iran
eghbalfariba@yahoo.com

Abstract: The purpose of this research was descriptive, correlational and identifies factors driving development of biotechnology in the agricultural sector of Iran. The current path of research and development show that the difference between industrial and developing countries in the application of biotechnology to agriculture and economic development are increasingly expands. Access to the technology needed to examine the benefits and pitfalls of this technology. The target population included all experts Alborz province's agricultural sector (N=196), which the number 126 proportional stratified sampling as a statistical sample were selected using the Krejcie & Morgan table and finally, 123 questionnaires were analyzed (n = 123). The validity using SPSS software and Cronbach's alpha was obtained. Descriptive findings showed that consistency is the most important indicator of development of biotechnology in agriculture. Also, the results showed that economic factors, information, education, advocacy and the government and its policies are the most important driving factors of agricultural development. The results of the analytical results showed that the factors driving the development of biotechnology with the development of biotechnology in the agricultural sector there is a significant relationship. Multiple linear regressions on economic factors, educational and extension privatization and able to analyze the 32.30 percent of the variability in development of biotechnology in agricultural sector of Iran have the educational and extension agent had the most important role.

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1. Introduction

Biotechnology is one of the newest technologies that increase agricultural production in the last decade. Biotechnology has many promising applications, but not a generic solution and not a substitute for existing methods, but also a way of helping to solve agricultural problems. Biotechnology is one of the hopes of the next century solution to meet the many different needs for human and food security for a growing world population is one of seven key technology field is the world in this century. Biotechnology products group of products are modified and these products are an important part of agriculture species, so that acceptance of genetically modified crops among farmers is getting faster and more comprehensive (Anonymou, 2008). In terms of definition, biotechnology is the use of microorganisms, cells, plants, animals, or parts of such enzymes to produce commercial products. Also biotechnology to create cells using the DNA genetic code of animals and plants (Padolina, 2007). We spent a period of time we find that poverty and hunger and its consequences, one of the challenges many countries in spite of good potential and capacity, failed to properly apply the existing capabilities (Gharehyazi, 2008).

Many experts and scholars, including international scientific and development community

believe that two or three-fold increase in global food production, health and food security for the world's 8 billion people in 2030 without Biotechnology is not possible. They sovereignty and prosperity of the present century the century of biotechnology and genetic engineering and consider the future of Second Green Revolution (Sanaati and Esmaeilzadeh, 2001).

Sharma et al. (2002) suggest that knowledge of biotechnology as the largest source of human technology is in the current century and a new Green Revolution called for overcoming poverty and hunger. Leisinger (2007) also believes that biotechnology can help to develop and improve the quantity and quality of human life. Investors and pay special attention to this superior technology is of great importance, so that in many developing countries has been selected as a national priority.

Therefore, genetically modified crops may have effects that are not yet visible. Despite a lack of public confidence in these products, yet there is fear and uncertainty about the health of biotechnological products. But with studies and research reports from credible sources on the other hand, some research have been done on these doubts is declining (James, 2005).

On the other hand, some studies show that this technology mainstream with new and unknown risks that may cause numerous questions and concerns. The

most important question is how developing countries can really improve production and increase the productivity of these capabilities to win control of the poor (FAO, 2005). Food safety also includes the effect of these products on the health of living organisms, especially their effects on human health (China, 2002 Ministry of Health of P.R.). Therefore, the production and application of biotechnological not without risk given the risks of the operation will assist in its effective application was considered.

Problem statement

An important part of Biotechnology "tissue culture" that has various applications in the field of medicinal plants, different aspects of the investigation is important.

With tissue culture technique can be achieved from a single cell into a whole plant. In this technique embryogenesis and organogenesis methods was used. Use this technique to accelerate the proliferation of mass-produced with mutations cause disease-free plants work throughout the year and will reduce costs. The next branch of biotechnology that has many applications in the field of medicinal plants was "genetic engineering". According to studies, the main environmental risks associated with genetically modified crops are: Changes in gene structure, gene transfer to other crops or native species and wild, as well as effects on other native species in adjacent ecosystems. Some of the other risks to the reduction in genetic diversity in crops and increased resistance to herbicides, pesticides and viruses are endemic species. The transfer of genes from genetically modified crops is a native species can cause spread of weeds and superior and stronger and cause unwanted findings of the various (Arriaga et al., 2006).

The fact that in every country: 1- adequate protection of research; 2- National Understanding (Strategic countable) Biotechnology; 3- relationship between industry and research centers; 4- History of a country in life sciences; 5- Research funds; 6- Government in support of manufacturing companies, biotechnology; 6- Skilled technical force specializing in biotechnology; 7- Coordination at the level of ministries; 8- The geographical location is suitable for the growth of biotechnology will be biotech products discussed researchers.

The current path of research and development show that the difference between industrial and developing countries in the application of biotechnology to agriculture and economic development are increasingly expands.

Access to the technology needed to examine the benefits and pitfalls of this technology. Therefore, extensive studies in this area should be obtained to identify factors affecting the development of

biotechnology in agriculture to rely on them to identify opportunities and threats and to reinforce the strengths and eliminate weaknesses of this new technology.

In fact, the main challenges in agricultural development, population growth, agricultural land, water supply, global climate change environment and natural conditions.

Importance of the issue

Biotechnology, particularly modern biotechnology, based on new scientific research has developed and is viewed as a new technological tool, because it rejected the potential impact on the economy has found other areas of social life.

Over two decades of delivering the first biotech crops, such as one of the most efficient technologies emerging industry, has been able to steal balls competition from other technologies, so that the reputation of the reliable sources of economic and Biotechnology Industry (the due to high value added) accounted for the highest rank in the world stock market. Given the enormous economic role of biotechnology, every day more investment is made in research and revenues; it has become a competitive industry against other industries.

Around the world today, especially in developed countries, is evaluating the applications of biotechnology in agriculture. Atmosphere for the development of agricultural biotechnology in different countries and in particular on the differences in laws, intellectual property rights and the public's perception of society is important. Modern Biotechnology in Iran with one or two decades from the mid-1980 than in developed countries has begun. But starting this activity and serious attention to this technology has been conducted in the last five years.

The past three decades, one of the most dynamic over the course of human history has been the development of science and technology. Given that biotechnology is one of the key disciplines of technology in the world, many developing countries in the field as part of their national R & D programs (UNSP, 1992).

China in 1999 with the production of cotton resistant to pests by transferring genes from *Bacillus* cotton production will increase and correspondingly also reduced pesticide. In addition, \$330 million was added to the income of farmers with limited land. Similar success in India through tissue culture and selection of the appropriate base and plant resistant to environmental stress was obtained (Krattiger, 1994).

Agricultural biotechnology began to work their way from the field of biotechnology to produce commercial products, several obstacles to legal problems and management of scientific and

technological constraints, economic factors and social concerns are met. Conservative assumptions laws in most countries is that you put all the plants are potentially dangerous. Risks associated with the transferred gene genotype has been created or not the methods used for gene transfer. There is no report about the harmful effects of environmental and other unforeseen risks or plants you put in thousands of field trial conducted in the international arena. There are, however, several concerns in relation to the agricultural system was created.

In recent years, many international organizations and countries around the world, drawing a set of administrative rules, policies, principles and methods of evaluation tests to genetically modified crops and their products began. Food and Agriculture Organization, and the World Health Organization (FAO / WHO) safety assessment first solution for modern biotech crops in 1991 and drafted guidelines in 1996 and 2000 to assess the safety of foods by using modern biotechnology or genetic engineering technology are produced, includes principles, criteria and evaluation methods, were released. In 1995, the FAO / WHO principles of risk analysis to evaluate the effect of chemicals on health foods composed of three parts: assessment, management and risk transfer founded (Deng et al. 2008).

A review of researches

Rooney (2006) study concluded that contacts a positive attitude towards biotechnology. In this prospective study showed that attitudes and in biotechnology stakeholders is an important factor in the application. Wheeler (2005) in a population study showed that the management of economic, environmental attitude plays an important role in the deployment of biotechnology, so that the three dimensions of about 55 percent of the variance in attitudes toward the use of biotechnology. Also relatively favorable attitudes in people have reported Aerni (2005) and cognitive aspects of belief in their studies show that biotechnologies significantly affect the attitude to use them.

Aerni (2002) in their study interested in environmental biotechnology; noting that attitudes in this regard, an important factor have been introduced. Vollmer et al (2007) Biotechnology necessary to achieve food security and health aspects of it Health Day effective step to achieve food security and sustainable agriculture expression that can increase the acceptance of these products was considered.

Friend of Earth Association (2003) in the UK, in a report the British people's attitudes towards the consumption of foods and biotechnology products has been evaluated at an acceptable level. In this report, the monitoring and management components in the

attitude of the people are the most important factor expressed in the use of biotechnology.

Dale (1999) in a study of various aspects of people's attitudes towards biotechnology has examined and finally concludes that aspects of health, vision and belief Biotechnology 76 percent of the attitude of people towards the use of biotechnology argue.

Mohammadian et al (2001) showed positive attitude toward using biotechnology products to express audience.

Azami et al (2008) study concluded that five factors of human and animal health, the livelihood of farmers, weed, social gaps in the operation of the product and the product performance in relation to the use of biotechnology professionals' attitudes about 74% of the variance explained. Among them the greatest amount of variance of human and animal health (34.079) and yield the least amount of variance (6.615), respectively. The study also found that professionals have a poor attitude towards the production of biotechnology products.

Akbari & Asadi (2008) in a study of the major communication channels influencing audiences' attitudes to the mass media (radio and TV) referred to this as newspapers and magazines are of particular importance. Also in this study, the correlations between attitudes toward organic products and educational level as well as significant differences between the attitudes of men and gender have been observed.

Hosseini et al (2008) in their study reached the conclusion: significant positive correlation between variables such as knowledge of product development GM, aware of the activities of the Research Products GM, holding discussions with consumers, improve communication between departments public and private, organize training activities, admission policies and policies on the production and acceptance of GM crops there.

Dehyouri et al (2008) study showed that from the perspective of promotion experts, social and cultural barriers and economic barriers are the main obstacle to the acceptance of these products had the lowest priority. Also in this study the policy and socio-cultural barriers 26% of the variance explained acceptance of biotechnology products.

Assumptions and research purposes

It is assumed that:

1. There is a direct relationship between adequate protection for biotechnology research and development.

2. There is a relationship between national understanding the (strategic countable) biotechnology and the development of biotechnology.

3. There is a direct relationship between industry and research centers and the development of biotechnology.

4. There is a relationship between history of a country in life sciences and biotechnology development.

5. There is a direct relationship funding research and development of biotechnology.

6. There is a relationship between biotechnology manufacturing firms and governments in support of the development of biotechnology.

7. There is a relationship between skilled technical force specializing in biotechnology and the development of biotechnology.

8. There is a relationship between coordination at the level of ministries and the development of biotechnology.

9. There is a relationship between geographical location for the development of biotechnology and biotechnology products.

10. There is a direct relationship between environmental factors and the development of biotechnology.

11. There is a relationship between information and Development of Biotechnology.

12. There is a relationship between research and development of biotechnology.

13. There is a direct relationship between educational factors promoting the development of biotechnology.

14. There is a direct relationship between economic factors and the development of biotechnology.

15. There is a direct relationship between social factors biotechnology culture and development.

16. There is a direct relationship between government and policy makers and development of biotechnology.

17. There is a direct relationship management and development of biotechnology.

18. There is a relationship between privatization and Investment and Development of Biotechnology.

Research Methodology

The study used a descriptive and correlation survey was conducted by questionnaire. The population of this study included all experts, including 76 people in the agricultural sector Alborz Province Agriculture Organization, 104 subjects with managements of Agriculture Karaj, Nazarabad, Savojbolagh and Taleghan and 16 in agricultural service centers Eshtehard, Asara, Seifabad and is Tankman (N = 196). Of these, 126 patients completed questionnaires, including 10 percent non-stratified sampling proportional to -Nvan the sample (including respondents' place of work as a class sampling) using

Krejcie, Morgan table, 1970 and finally 123 questionnaires were analyzed (n = 123). The instrument used in this study was a questionnaire to collect data and information. The question was designed in two parts.

The first part examines the driving forces in the economic development of biotechnology in the agricultural sector (13 items), Government and its policies (19 items), Socio-cultural (7 items), Research (6 items), information (3 items), Privatization and Investment (5 items), management (6 items), Biology - Environment (3 items), Educational - extension (6 items). It is noteworthy that five-point Likert scale was used to assess this part of (1- very low, 2- low, 3- average, 4- high, 5- very high). The second part is to gather information about personal and professional characteristics of respondents, respectively. The validity of several versions of the questionnaire professor of agricultural extension and education, experts and specialists of the Institute of Agricultural Biotechnology Agriculture Organization Alborz Province, Karaj city were placed and based on their recommendations, was approved. Validity of a total of 30 questionnaires out of the population (Agriculture Organization of Tehran Province) was distributed. After collecting the above-mentioned questionnaire, data entered into the computer and using software SPSSV and Cronbach's alpha test, validate part of the questionnaire was between 0.78-0.95.

Results:

Forty-one of the respondents in response to questions on training courses related to biotechnology companies having 82 options yes and no options were mentioned. Also, respondents participating in courses on average have five training courses related to biotech companies.

Survey respondents' familiarity with biotechnology and its relevance showed that the majority of respondents' knowledge of biotechnology and its relevance in the average (64 people or 52.03 percent). In addition, eight patients (6.52 percent) in the high and very high level with biotechnology and related concepts are familiar.

The mean, standard deviation, coefficient of variation and prioritize the development of biotechnology in agriculture shown in Table 1. Prioritizing these factors using the coefficient of variation coefficient of variation showed that consistent with 26/0, cost-effectiveness with a coefficient of variation, 0.28, available the coefficient of variation, and the availability 0.33 and of the coefficient of variation 0.34, the most important role in the development of biotechnology.

Table 1. The evaluation of the development of biotechnology in agriculture (n = 123)

Evaluate the development of biotechnology	Mean *	SD	Coefficient of variation	Priority
Compatibility	3.54	0.93	0.26	1
Cost-effectiveness	3.64	1.02	0.28	2
Acceptability	3.48	1.16	0.33	3
Availability	3.25	1.11	0.34	4

* (1- very low, 2- low, 3- average, 4- high, 5- very high)

The importance of the development of biotechnology in agriculture

The mean, standard deviation, coefficient of variation and prioritize the factors driving development of biotechnology in the agricultural sector is shown in Table 2. Prioritizing these factors using the coefficient of variation showed that environmental factors, information, research and extension education are the most important factors driving development of biotechnology in agriculture.

Table 2. The importance of prioritizing the development of biotechnology in agriculture (n = 123)

Promoter factors	Mean*	SD	Priority
Environmental	3.95	0.94	1
Informing	3.89	0.89	2
Experimental	3.7	0.88	3
Educational and extension	3.69	0.84	4
Economic	3.67	0.68	5
Social - cultural	3.62	0.92	6
Government and policy making	3.59	0.83	7
Management	3.58	0.91	8
Privatization and Investment	3.44	0.98	9

* (1- very low, 2- low, 3- average, 4- high, 5- very high)

Inferential analysis

a- correlation between the developments of biotechnology in the agricultural sector Development of Biotechnology in Iran

Pearson correlation index showed that there is no significant relationship between environmental Promoter factors ($p < 0.05$ and $r = 0.164$). And Information ($p > 0.05$ and $r = 0.143$) with the development of biotechnology in agriculture section of Iran. The Pearson correlation coefficient was calculated for economic agents ($r = 0.441$ and $p < 0.01$), the government and its policies ($r = 0.389$ and $p < 0.01$), Socio-cultural ($r = 0.341$ and $p < 0.01$), Experimental ($r = 0.282$ and $p < 0.01$), Management ($r = 0.315$ and $p < 0.01$), Education and promotion ($r =$

0.221 and $p < 0.05$). With the development of biotechnology in the agricultural sector showed that between these factors with the development of biotechnology in the agricultural sector and there is a significant positive relationship.

Table 3. Correlation between Promoter factors the development of biotechnology development of biotechnology in the agricultural sector of Iran (n = 123)

Variable	t	p
Economic	0.441**	0.000
Government and policy making	0.389**	0.000
Social - cultural	0.349**	0.000
Experimental	0.282**	0.002
Privatization and Investment	0.279**	0.001
Management	0.315**	0.000
Environmental	0.164	0.69
Educational and extension	0.221	0.14
Informing	0.143	0.115

** $P \leq 0.01$; * $P \leq 0.05$

Predictive model development of biotechnology in the agricultural sector in Iran

In this study, to predict the development of biotechnology in the agricultural sector of the stepwise multiple regressions were used. Multiple regression analysis using linear combination of independent variables to predict the dependent variable is important. Stepwise method in which the strongest variables in the equation, one by one, and it will continue until the error is a significant test to five percent. After entering all significant correlation factors, the economic factors, education, extension and privatization were variables. These variables are able to analyze the 32.30 percent of the variability in development of biotechnology in the agricultural sector. On the other hand, the standardized coefficients (β) revealed that educational factors - extension to other factors and more important role in explaining the development of biotechnology in the agricultural sector of Iran.

Table 4. Stepwise multiple regression coefficients Dependent variable: development of biotechnology in agriculture

Independent variables	B	β	t	P
Educational and extension agents (x1)	1.966	0.504	3.41	0.001
Operating investments (x2)	1.461	0.436	3.09	0.002
Economic factors (X3)	1.05	0.218	1.81	0.042
Constant number	5.22	-	3.40	0.001

P=0.000; F= 14.084; R2 adjust =0.317; R=0.568

$$Y = a + b_1(X_1) + b_2(X_2) + b_3(X_3)$$

$$Y = 5.22 + 1.966 X_1 + 1.461 X_2 + 1.05 X_3$$

Discussion and conclusion

Approximately 30% of the respondents (41 people) in courses related to biotechnology and its relevance averaging 5 course participated. This situation, while the majority of respondents (64 percent or 52.03) their knowledge of biotechnology and its relevance to the average level is necessary.

The view of respondents, the most consistent indicator of development of biotechnology in the agricultural sector was considered. Indicators of cost-effectiveness and acceptability were important in the next rank. Among economic factors and the development of biotechnology in the one percent positive and significant relationship existed. This reflects the fact that if the manufacturers of performance and revenues have sufficient confidence that we can hope to develop this type of technology. These findings and research results are consistent with Hosseini et al., 2011.

The interaction between the government and its policies and the development of biotechnology in the one percent positive and significant correlation was obtained. The financial support of the state in production through incentives such as temporary monetary and fiscal exemptions and the removal of customs tariffs for exports of heavy most important factor in the development of biotechnology were considered. These findings Naimi research (1388) has been inconsistent. Socio-cultural factors and the development of biotechnology in the one percent was a significant positive correlation. So that by increasing the knowledge and awareness about biotechnology products and promote use of healthy food products, which is known as the most important factor could improve the development of biotechnology. These findings and research results Karami et al. (2008) and (Aerni, 2002).

The experimental and development of biotechnology at the level of one percent was a significant positive relationship. And continuous build a stronger relationship between research and extension in this regard as the most important factor is introduced. This finding is consistent with research findings of Hosseini et al., 2011. Between educational

factors - promote the development of biotechnology in a positive and significant relationship between the levels of one percent, respectively. The students on the topic of biotechnology through education and proper scheduling can be the basis for the development of this new technology flourish. These findings have been inconsistent Naimi research (2009). Information and Development of Biotechnology at the level of one percent between positive and significant correlation was obtained. As we know, the role of media in the development and promotion of a new technology is undeniable. Between environmental factors and the development of biotechnology in a positive and significant relationship between the levels of one percent is vital. So, pesticide use reduction as the most important factor in the development of biotechnology has been introduced. This is in line Naimi Research (2009) and contrary to the findings of Karami and colleagues (2008).

Between privatization and development of biotechnology at the level of one percent was a significant positive relationship. Similarly, the management and development of biotechnology in a positive and significant relationship between the levels of one percent is considered. Multiple linear regressions on economic factors, educational - extension and privatization able to analyze the 32.30 percent of Iran have the development of biotechnology in agriculture. On the other hand, the standardized coefficients (β) revealed that educational and extension to other factors and more important role in explaining the development of biotechnology in the agricultural sector of Iran.

Suggestions

1. The institutions responsible for the investment and allocation of funds to facilitate the development of biotechnology in agricultural sector of Iran, however, seems to be creating niche markets can accelerate the development of this product, it led to the development sustainable production products will be marketing.

2. Agricultural Education experts a greater role in the promotion and transfer of new technologies. For example, it is possible at all stages of land preparation, planting, pest and diseases and... to all three stages along with the classes, run movies, and even the way farm results by providing packages preparations in this regard, to producers and consumers, they will advise on the production or purchase such products.

3. The management structure in order to use biotechnology in agricultural sector managers, competent, experienced and expert management in different categories according to their expertise and need to be revised, because one of the most important factors in the development of biotechnology in the stability management system and futurist vision is among managers.

4. Planning principles for basic resources, environmental, climate and social issues of agricultural production.

5. Sustainable development requires a dynamic balance between the criteria of economic, social and environmental (Krattiger, 1994).

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