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The deterrent and promoter influencing to increase area cultivated Iranian Ox-Tongue (fuzzy analysis in delphi method)

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Abstract

Present study was performed aiming to recognize the obstacles confronting expansion of Iranian ox-tongue (*Echium amoenum* Fisch and Mey). This study was performed by Delphi technique. In the same line, seven experienced and qualified expert on the area of *Echium amoenum* plantation and production in Eshkevarat, Guilan province, considered as specialized panel members of present study. In the first stage of the study, given the fact that multivariate analysis is a suitable technique to analyze the data resulting from open questions of the questionnaire, thus this technique was used to analyze the content. After performing the second stage, results of Kendall's W test indicated the agreement of experts, thus performing the third stage was not necessary. In general, results indicated that the most important problems confronting the expansion of *Echium amoenum* Fisch and Mey are: failure to define the expert price of *Echium amoenum* Fisch and Mey, lack of active production cooperative societies, lack of properly application of cultivation, maintenance and Harvesting and lack of training, welfare, treatment and employment facilities across the region. Additionally, in line with realization of study objectives, some strategies were suggested by the experts including improving the *Echium amoenum* Fisch and Mey orchards and varieties, increasing the economical cultivated area, constructing processing and packaging companies to raise the products added value, encouraging the farmers to use novel research techniques, providing sustainable, active market places, Guaranteed Purchase, suitable domestic and international marketing and adequate knowledge on the suitable soil and fertilizer for *Echium amoenum* Fisch and Mey.

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Introduction

Nowadays, importance of agriculture sector in terms of regular and conventional functions such as supplying the food stock raw materials for industries, export, foreign exchange creation, and employment is very prominent. Supporting the agriculture sector is an inevitable necessity which realization will affect on the benefits of all social classes and economical sectors (Hosseini and Torshizy, 2009).

Increasing tendency towards using the herbal medicine and medical plants worldwide motivated particular interest to these plants. Even in modern time, according to world Health Organization (WHO), 25% of popular medicines are based on plants (Vejdani and Selgi, 2008). Volume of international trade of medical plants increased from 355 million dolors in 1976 to 5.51 billion doors in 2002 and up to 2050 it will reach to 5 trillion dolors. Financial circulation of this trade has raised up to 100 billion dolor's. About 25% of pharmaceutics market worldwide in 1996 with approximately 250 billion dolor value was related to the medicines extracted from plants. Share of Iran in this market is about 60 million floor (Mirhosseint and Sabeghi, 2008; Ebrahimi, 2008 and Yazdani and Shahnazi, 2008). More than 500 ha lands in Guilan province in north of Iran is traditionally devoted to the cultivation of Iranian ox-tongue (*Echium amoenum*) and about 300 tones *Echium amoenum* is harvested from these lands.

Unfortunately, in our country despite the long history on consumption of medical plants and its brilliant records on the knowledge of medical plants as well as great diversity of medical species as a natural rich economical source and as a result potential capabilities in the production and export of medical plants, still a fundamental step is not taken properly in respect of identification, domestication and massive cultivation of these plants (Bagheri *et al*., 2008; Akbarinia *et al*., 2006).

Meanwhile, several studies have been performed to analyze the obstacles and problems of development in the agriculture sector. Where each research has considered different factors and components as important. Here, according to their relevance to the study subject, we will address some of them. Findings of Haji Mir Rahimy, *et al* (2007) indicated that the most important challenge and external obstacle preventing the development of agriculture and gardening are issues such as poor rules to prevent land fragmentation and making mandatory to observe the economic size of production units and poor packaging subsystems, transporting, marketing and transmitting the agricultural products to the market. Hall (2003) suggested profitability is achieved through improving the pricing processes, mean while this author considers decisions relating to pricing as one of problems among the decisions on the marketing of their studied products, he recognizes lack of adequate knowledge on productions and product costs and prices of competitors as well as required time interval for producing and sending the product to the market as major obstacles of development. He considers using past information and data related to future logical budgeting and developing a proper pricing strategy consistent to budgeting decision as the only possible way to succeed. Furthermore, Blokland (2003) identifies effective product supplying to the market as the key point for profitability of products. He suggests improvement of function and processes of marketing and market supplying as the most important factors influencing in development factors influencing on development. Karim and Hashemi (2009) in a field study addressed the challenges of sustainable rural development in the villedge Jazink in sistan and Balouchestan province using the villager's opinions. Using factorial analysis, they summarized 61 preventive variables of sustainable rural developmental and institutional environment, social environment, conduct manner and sustainable conservation of basic resources, ecologic environment and biome and basic resources management technique. In the study by Behnia and Arvandi (2005), issues such as lack of proper management of ground providing, lack of production institutions, lack

of suitable aeration, lack of training and continuous visit are suggested as the factors and abstracts to develop greenhouse cultivation in Khouzestan province. Shafeghat *et al* (2009) in a provincial study addressed the practical challenges of rural sustainable development in Mazandaran province and reported that most important challenges of rural sustainable development are variables including low knowledge and awareness of villagers, excessive use of external inputs, agricultural and pasture land use change to residential and industrial activity usage, increasing rate of migration from villages and depletion of villages, excessive and non systematic exploitation of water and soil resources, low participation of villagers, poverty, unemployment and shortage of employment opportunities in the villages, slow rate of formation of local rural institutions, lack of job diversity, failure to attention to the biological – environmental considerations in rural development plans, inattention to native knowledge and lack of equal development opportunities among rural and urban societies. Since, so far no study was performed on the factors preventing the *Echium amoenum* cultivation development, present study tried to study these factors from various aspects. Thus, the major objective of this study is analyzing the preventive and promoting factors of *Echium amoenum* cultivation development in Guilan province, North of Iran.

Materials and Methods

Location and Survey

This study was performed using Delphi technique in Eshkevarat region, Guilan Province (North of Iran), in 2011. Delphi technique is a qualitative procedure where it is possible that there is no theory related to the study or the author is not inclined to restrict his/ her work to the available theories. So that, qualitative procedure may be applied to formulate a new theory to explain the phenomenon or to describe new patterns found in data (Mashayekhy *et al*., 2005).

Delphi Method

Delphi technique as a qualitative research technique has this capability. Basis of Delphi technique is on the fact that the opinion of professionals of each scientific area on the prediction of future is most reliable opinion. Thus, contrary to the survey techniques, credibility of Delphi technique is not depended on the number of participants in the study but on the scientific credibility of professionals participating in the research. Participants of Delphi study are consisting of 5 to 20 individuals. Minimum number of participants depends on how to plan the methodology. Delphi is a systematic procedure in the study to derive the opinions of a group of professionals on an issue or question (Ahmadi *et al*., 2008). On this regard, 7 experienced and skillful experts on Iranian *Echium amoenum* cultivation and production in Eshkevarat region, Guilan province, consisted the professional panels' members in this study.

Delphi First Stage

In the first stage of this study, 5 questions regarding the obstacles confronting the *Echium amoenum* Fisch and Mey development and effective strategies for sustainable development of *Echium amoenum* Fisch and Mey were studied. Since multivariate analysis is a suitable technique to analyze the data resulting from open questions of questionnaire, thus this statistic technique was used to analyze the questions explained in the first stages of the study. In the first step, all the responses if these questions were examined. Then, maximum number of answers by studied subjects were defined. Following, based on the maximum number of cases provided by the experts, the number of cases provided by the experts, the number of variables were defined. Statistic analysis was performed using SPSS16 software. Output data of this analysis were response frequency, response percentage, cases frequency and cases percentage.

Delphi Second Stage

After analyzing the content of responses provided in the first stage, a questionnaire was formulated for second round where participants were asked to explain their agreement rate regarding each problem

and strategies suggested in terms of five score Likert scale (1: very disagree to 5 :very agreed). To analyze the data, in present study statistical indexes of mean, standard deviation, change ration, Kendall's W coefficient and fuzzy screening. Changes ratio variable is used to study the distribution of data measured in the nominal or serial scale. In fact, this variable is used to study the consistency or non consistency of responses. For its calculation, following equation is used (Kalantari, 2012).

$$VR = 1 - \frac{Maximum\ frequency}{Total\ frequency}$$

In this study, Kendall's W consistency coefficient was used to define the consensus rate of panel members. Kendal consistency coefficient is a measure to define consistency and agreement rate among several series of scores related to N objects or persons. In fact, by using this measure, it is possible to find the score correlation between K series of scores. Such a measure is useful particularly in the studies relating to the "relevance among the judges". Kendall's W consistency coefficient indicates that individuals arranging several items based on their importance fundamentally applied similar measures to judge on the importance of each item thus in this regard agree to each other.

This scale is calculated using following equation (Kalantari, 2012):

$$w = \frac{s}{\frac{1}{12}K^2(N^3 - N)}$$

Where: $s = \sum\left(R_j - \frac{\sum R_j}{N}\right)^2$

s = Sum of square of standard deviations of R_j from $_j$ means,

R_j Total of score relating to a factor.

K= The number of scores sets (the numbers of turns).

N= The number of ranked factors.

$\frac{1}{12}K^2(N^3 - N)$ = Maximum sum of squares of deviations from mean R_j.

i. e. sum of S observing if there is complete agreement between K rankings.

Amount of this scale is equity when there is complete consistency or agreement and is zero when there is no complete consistency. Thus, if Kendall's W consistency coefficient rate doesn't change or if it is slightly raised, it indicates that there is no increase in the agreement and opinion asking may be terminated.

Fuzzy screening

This technique first was development by Lotfizdeh, an Iranian origin professor in Columbia University in 1965, was used as a tool to confront a non accurate ambiguity called fuzziness, in human systems (systems with human interaction) and decision making process. Fuzzy sets theory provides a mathematical framework and decreases the need to accurate data. Since it is possible to define the relationships between variables and probability rates using inaccurate estimates of variables rates. Fuzzy sets theory is used to solve the problems where parameters and quantities' can't be defined precisely. Fuzzy decision was making tries to remove the ambiguities and uncertainties inherent to the preferences, objectives and limitations available in the decision making problems. Performing the calculations with fuzzy numbers is very time – consuming and complex due to its specific structure. Particular fuzzy numbers are used in the calculations to facilitate and applicability of fuzzy numbers. In this study also after gathering the questionnaires, since the responses were mentioned as five point qualitative numbers from very high to very low importance, to each option is assigned a fuzzy triangular number shown in table (1).

Table 1: Conversion triangular fuzzy numbers to a certain number

Number of qualitative	Triangular fuzzy number	Final fuzzy number
Very low Importance (Very disagree)	(0,0,0.25)	0.075
Low importance (disagree)	(0,0.3,0.5)	0.275
The medium (intermediate)	(0.2,0.5,0.8)	0.5
High-importance (I agree)	(0.5,0.7,1)	0.725
High importance (Very agree)	(0.7,1,1)	0.925

In addition, given the fact that for calculating the matrix constant value, quantitative Deterministic numbers are needed, after adjusting each index to the fuzzy numbers are transformed to the quantitative deterministic numbers (defuzzing). In fuzzy literature, there are several methods for this operation; among them are methods such as gravity, minimum average, and minimum maximum. One of widely used techniques is using Murkowski formula ($X = m + \frac{B-a}{4}$), by which above mentioned fuzzy numbers were equated to deterministic number shown in table (1).

After of acquired responses of each indicator to the deterministic numbers and dividing the product to the number of respondents, weight of each indicator is achieved.

By dividing the weight of each indicator on the total weights of indicators, normalized weight is achieved. For example, the weight of indicator lack of constancy in the executioner policies and plans and distrust to this category is calculated as follows:

$$\text{Indicator weight} = \frac{\text{very low important frequency} \times 0.075 + \ldots + + \text{very high important frequency} \times 0.925}{\text{the number of respondants}}$$

$$\text{Normalized weight} = \frac{\text{weight of each indicator}}{\text{total weight of each indicator}}$$

Performing the calculation using fuzzy numbers and acquiring and unrealizable result taking the number of indicators to be testes using this technique is very time – consuming and complex due to their specific structure. To facilitate the achievement of results and decreasing the errors common in these calculations, Microsoft Excel 2007 was used in this study to prevent limitations of this kind of calculations while accelerating the achievement of results.

Results and Discussion

Demographic Characteristics

Characteristics of experts are given in table (2). Based on this table, mean age of experts participating in this study was about 33 years. Mean records of these experts was 10 years in the region. Four experts had M. S. degree and 3 experts had M. S. C degree.

Table 2. the frequency characteristics of experts.

Variable		Frequency	Percent of Frequency	Mean	Std. Deviation
Age	Less than 25 years	1	14.3	33.857	10.761
	More than 25 years	6	85.7		
Experience	Less than 15 years	5	71.4	8.71	10.812
	More than 15 years	2	28.6		
Level of Education	B. Sc	4	57.1	–	–
	M.Sc.	3	42.9		

Fuzzy Analysis Results

Results of this study indicated that failure to define an expert price for *Echium amoenum* Fisch and Mey is the major economic problem confronting the development if *Echium amoenum* Fisch and Mey. So that, in the first stage of study, 85/71% of experts mentioned this problem. And in the second stage also it accounted for highest score of normalized weight after fuzzy screening. Following, issues such as lack of flower drying and processing industries to increase to products value added, lack of suitable marketing and reliable market and warranted buying are considered in second importance. Other mentioned economic issues are also given in table (3). In general, all of these issues may account for part of economic obstacles in *Echium amoenum* Fisch and Mey development.

Results of social subjects represent the importance of failure to define an expert price for *Echium amoenum* Fisch and Mey in the course of *Echium amoenum* Fisch and Mey development. In the first stage of this study, 3 experts mentioned this issue. In the second stage also, the greatest score of normalized weighted was assigned to this problem. Following, problems such as unacceptance of new ideas and innovations were placed in the second preference due to low education status and failure to improve the farmer's knowledge level to the minimum current knowledge. Other important socio – cultural problems were explained by experts which are mentioned in the remainder of prioritization of table (4).

Results of this study indicate that many technical issues may affect on the failure of *Echium amoenum* development. In the same line, after analyzing the stages 1 and 2 of the study, lack of proper execution of cultivation, maintenance and Harvesting was considered as the first priority of technical problems. This problem in the first stage was mentioned by 71.43% of experts. In the second stage also the greatest score of normalized weight was assigned to this problem. Following, non usage of the state of the art technology and machineries in the production and processing sector was considered as the second important technical problems confronting the *Echium amoenum* Fisch and Mey development. Shortage of skilled man power was considered as high important. So that in the first stage, all the studied experts referred to it. In the continuation of table (5), other technical problems maintained by the experts are given.

In this study, after examining the managerial problems of *Echium amoenum* Fisch and Mey development, important problems were mentions which are given in table (6). Lack of training, welfare, caring and employing facilities required across the area are major managerial problems mentioned by experts. In the first stage of study, all the experts mentioned this problem. And in the second stage achieved the highest score of normalized weight. In

the second priority of managerial problems was lack of policy making for preventing the youth's migration from villages to the cities. As well lack of sustainable internal market also was among the issues originating from unsustainable management.

At the end of this study, strategies was suggested for sustainable development of *Echium amoenum* Fisch and Mey by studies experts, most important of them was improvement of farms and varieties of *Echium amoenum* Fisch and Mey, increasing the economical cultivated land area, establishment of processing and packaging companies to increase the product's added value, encouraging the farmers to use new research techniques, providing the sustainable, active market places as well as warranted buying, suitable national and international marketing and adequate knowledge on the suitable kind of soil and fertilizer for cultivation of *Echium amoenum* Fisch and Mey (table 7).

Many studies were performed in the past years which were consistent to the results of present study. In the previous studies, variables involving in the general factors playing the promoting role in the novel agricultural technologies development are : climate (Sepehr, 1992), presence of academic and non – academic research centers (Motaghi Talab, 2003), cultivated area (Damad Zadeh and Seifollahy, 1996), greenhouse and industrial towns (Moradi *et al*., 2003), forests and pastures (Amiri and Hosseini, 1995), general governmental policies related to the agricultural development (Khatoon Abady, 2000), risk decreasing rules of presence of growth centers (Navabpour, 2004), mental, legal, marketing supports, stepwise supportive rules (Behian, 2006), technology transfer (Khosravym 2003), reverse engineering (Sedigh and Ardeshiry, 2003), brains evolution, technology naturalization, acceleration of trend, commercialization of research achievements (Khosravy, 2003), accordance to social networks programs and their economic plans (Motaghy Talab, 2003), acceptance culture, education and specialty of managers and executors of growth centers (Moatazavypour, 2003), executable programming (Moatazavypour, 2003), utilizing the knowledge management (Sedigh and Ardeshiry, 2003), viewing the issues with institutional registering (soltani, 2003), suitable cultural grounds (Moradi *et al*., 2003), education, specification and commitment of park managers (Motaghy Talab, 2003), presence of consumption and demand market (Rezvany, 2002), supplying the credit required for investment (Rasool Zadeh, 2002), presence of economic motives in the marketing (Bischoff, 2002), defining the credit supplying sources (Sherman and Chappell, 1998), resultant income consistent to international market and contrary to the society's economic slope, tax exemption (Valy zadeh, 2007) and Work and live near the lower cost (Sepehr, 1992). Meanwhile same scholars and professionals, mentioned following problems as the variables contributing in the general factor with preventive role in the development of novel agricultural technologies : unemployment (Bischoff, 2002), financial unsuitable bases of shortage of income (Rasoulzadeh, 2002), attention of farmers to traditional production (Khatoon Abady, 2000), cooperation moral (Valizadeh, 2007), location of construction (Motaghy Talab and Balalaey, 2003), roads connecting sestems and transportation, communication infrastructure (Samaei, 2005), reasonable loan repayment, rules relating to export and import (Mirza Amini, 2005), infrastructures of power supply (Samaey, 2005), rules relating to the intellectual property (Khosravy, 2003), rules of world trade organization (Bischoff, 2002), Administrative bureaucracy (Khosravy, 2003), rules relation multinational companies (Bischoff, 2002), formation of businesses through offering various services, providing business and marketing plans, constructing managerial plans, capital gain and accessibility of services (Sherman and Chappell, 1998).

Table 3. Economics Problems to the development of the cultivated area.

Economics Problems	First Stage			Second Stage						Rank
	Number of Responses	Percent of Responses	Percent of Cases	Mean	Std. Deviation	VR	Importance	Normalized weight	Normalized weight rating	
Failure to define the expert price of *Echium amoenum*	6	13.04	85.71	4.857	0.378	0.143	0.8964	0.1118	11.1804	1
Lack of industrial drying and processing Flower for increased value added products	5	10.87	71.43	4.714	0.488	0.286	0.8679	0.1082	10.8241	2
Lack of proper marketing	5	10.87	71.43	4.714	0.488	0.286	0.8679	0.1082	10.8241	2
Lack of reliable market and shopping guarantee	5	10.87	71.43	4.714	0.488	0.286	0.8679	0.1082	10.8241	2
Lack of transfer of low interest loans to farmers	4	8.70	57.14	4.571	0.535	0.429	0.8393	0.1047	10.4677	3
Area under cultivation is limited and Lack of to the size cultivated gardens	7	15.22	100	4.429	0.535	0.571	0.8107	0.1011	10.1114	4
Before selling a product with a lower price to intermediaries (speculators)	6	13.04	85.71	4.286	0.756	0.571	0.7786	0.0971	9.7105	5
Lack of embrace the new technologies such as the water pressure to produce economic	3	6.52	42.86	4.143	0.690	0.714	0.7500	0.0935	9.3541	6
Uncertainty for farmers to invest in the construction of new gardens	2	4.35	28.57	4.000	0.817	0.714	0.7179	0.0895	8.9532	7
Mismatch to incomes from flower compared to cost of product	3	6.52	42.86	0.571	1.272	0.714	0.6214	0.0775	7.7506	8
Total	46	100	657.14	-	-	-	8.0179	1	100	-

Table 4. Social and cultural Problems to the development of the cultivated area.

Socio-Cultural Problems	First Stage			Second Stage						
	Number of Responses	Percent of Responses	Percent of Cases	Mean	Std. Deviation	VR	Importance	Normalized weight	Normalized weight rating	Rank
Lack of active production cooperative societies	3	8.57	42.86	4.286	0.488	0.714	0.7821	0.1077	10.7723	1
Rejection of new ideas and innovation due to the low level of education	4	11.43	57.14	4.286	0.756	0.571	0.7786	0.1072	10.7231	2
Farmers Lack of the knowledge level of the minimum of the Day	4	11.43	57.14	4.286	0.756	0.571	0.7786	0.1072	10.7231	2
The high age of gardeners	3	8.57	42.86	4.143	0.690	0.714	0.7500	0.1033	10.3296	3
Young people migration of cities seeking work and education	3	8.57	42.86	4.143	0.690	0.714	0.7500	0.1033	10.3296	3
Limited communication with farmers, Extension and Education Centers	5	14.29	71.43	4.143	0.900	0.571	0.7464	0.1028	10.2804	4
Lack of attractiveness of flower production for young people in rural	4	11.43	57.14	4.143	0.900	0.571	0.7464	0.1028	10.2804	5
Lack of interest in the community to take Flower	4	11.43	57.14	4.143	1.215	0.429	0.7429	0.1023	10.2312	6
Lack of adequate communication for the availability of new findings	3	8.57	42.86	3.429	1.134	0.857	0.5929	0.0817	8.1653	7
Structural making changes culturally appropriate infrastructure and adequate information	2	5.71	28.57	3.429	1.134	0.857	0.5929	0.0817	8.1653	8
Total	35	100	500	-	-	-	7.2607	1	100	-

Table 5. Technical Problems to the development of the cultivated area.

Technical Problems	First Stage			Second Stage						
	Number of Responses	Percent of Responses	Percent of Cases	Mean	Std. Deviation	VR	Importance	Normalized weight	Normalized weight rating	Rank
Lack of properly application of cultivation, maintenance and Harvesting	5	12.20	71.43	4.571	0.787	0.286	0.8357	0.1208	12.0805	1
No use of machinery and technology in the production and Processing	5	12.20	71.43	4.429	0.535	0.571	0.8107	0.1172	11.7192	2
Lack of skilled human resources	7	17.07	100.00	4.429	0.787	0.429	0.8071	0.1167	11.6675	3
Lack of attention to perform applied research in gardener	2	4.88	28.57	4.143	0.378	0.857	0.7536	0.1089	10.8931	4
Fungal diseases and pests, pollen-eating beetles	6	14.63	85.71	4.143	0.690	0.714	0.7500	0.1084	10.8415	5
Lack of sufficient knowledge of various varieties suitable for planting	5	12.20	71.43	4.143	0.690	0.714	0.7500	0.1084	10.8415	6
Lack of mechanization in Harvesting and processing sectors	5	12.20	71.43	4.143	1.069	0.571	0.7464	0.1079	10.7899	7
Lack of sufficient knowledge of soils suitable for cultivation	3	7.32	42.86	4.143	1.069	0.571	0.7464	0.1079	10.7899	8
Lack of understanding of the type and amount of fertilizer product	3	7.32	42.86	4.000	0.817	0.714	0.7179	0.1038	10.3769	9
Total	41	100	585.71	-	-	-	6.9179	1	100	-

Table 6. Management Problems to the development of the cultivated area.

Management Problems	First Stage			Second Stage						
	Number of Responses	Percent of Responses	Percent of Cases	Mean	Std. Deviation	VR	Importance	Normalized weight	Normalized weight rating	Rank
Lack of training, welfare, treatment and employment facilities across the regio	7.00	17.95	100.00	4.857	0.378	0.143	0.8964	0.1220	12.2022	1
Lack of policy to prevent young people from rural to urban the migration	6.00	15.38	85.71	4.714	0.488	0.286	0.8679	0.1181	11.8133	2
Lack of a stable domestic market	3.00	7.69	42.86	4.571	0.535	0.429	0.8393	0.1142	11.4244	3
Disability organizations trade removing barriers in manufacturing and marketing	5.00	12.82	71.43	4.429	0.535	0.571	0.8107	0.1104	11.0355	4
Lack of adequate publicity about the benefits of *Echium amoenum*	4.00	10.26	57.14	4.429	0.535	0.571	0.8107	0.1104	11.0355	5
Lack of distributing and placing *Echium amoenum* Iranian household basket	2.00	5.13	28.57	4.429	0.535	0.571	0.8107	0.1104	11.0355	6
Ignore *Echium amoenum* status in the rural economy of Guilan	6.00	15.38	85.71	4.429	0.787	0.429	0.8071	0.1099	10.9869	7
Multi Rates of prices and abuse of *Echium amoenum* speculators in purchase it	3.00	7.69	42.86	4.286	0.488	0.714	0.7821	0.1065	10.6466	8
Lack of attention to improve infrastructure in the industrial sector of *Echium amoenum*	3.00	7.69	42.86	4.000	0.577	0.857	0.7214	0.0982	9.8201	9
Total	39	100	557.14	-	-	-	7.3464	1	100	-

Table 7. Strategies for the development of the area under cultivation *Echium amoenum*.

Development Strategies	First Stage of research			Second Stage of research						
	Number of Responses	Percent of Responses	Percent of Cases	Mean	Std. Deviation	VR	Importance	Norm-alized weight	Norm-alized weight rating	Rank
Improving the *Echium amoenum* orchards and varieties	4.00	4.26	57.14	4.571	0.535	0.429	0.8393	0.0485	4.8524	1
Increasing the economical cultivated area	6.00	6.38	85.71	4.429	0.535	0.571	0.8107	0.0469	4.6872	2
Constructing processing and packaging companies to raise the products added value	6.00	6.38	85.71	4.429	0.535	0.571	0.8107	0.0469	4.6872	2
Encouraging the farmers to use novel research techniques	6.00	6.38	85.71	4.429	0.535	0.571	0.8107	0.0469	4.6872	2
Providing sustainable, active market places and Guaranteed Purchase	5.00	5.32	71.43	4.429	0.535	0.571	0.8107	0.0469	4.6872	3
Suitable domestic and international marketing	5.00	5.32	71.43	4.429	0.535	0.571	0.8107	0.0469	4.6872	3
Adequate knowledge on the suitable soil and fertilizer for *Echium amoenum* Fisch and Mey	5.00	5.32	71.43	4.429	0.535	0.571	0.8107	0.0469	4.6872	3
Applied research in the production and post production	3.00	3.19	42.86	4.429	0.535	0.571	0.8107	0.0469	4.6872	4
Rising health care, education, welfare and employment in the region	3.00	3.19	42.86	4.429	0.535	0.571	0.8107	0.0469	4.6872	4
The correct planning is based on a fully organized and detailed study	2.00	2.13	28.57	4.429	0.535	0.571	0.8107	0.0469	4.6872	5
Enhance communication with farmers, Extension and Education Centers	4.00	4.26	57.14	4.286	0.488	0.714	0.7821	0.0452	4.5220	6
Further to communicate research centers with farmers	3.00	3.19	42.86	4.286	0.488	0.714	0.7821	0.0452	4.5220	7
The variety of products harvested product	3.00	3.19	42.86	4.286	0.488	0.714	0.7821	0.0452	4.5220	7
Expert determine the price of *Echium amoenum*	7.00	7.45	100.00	4.286	0.756	0.571	0.7786	0.0450	4.5013	8
Manpower training in the processing of *Echium amoenum*	4.00	4.26	57.14	4.286	0.756	0.571	0.7786	0.0450	4.5013	9
Create a dynamic and effective production cooperatives	4.00	4.26	57.14	4.286	0.756	0.571	0.7786	0.0450	4.5013	9
Create a policy to prevent young people from rural to urban migration	4.00	4.26	57.14	4.286	0.756	0.571	0.7786	0.0450	4.5013	9

Development Strategies	First Stage of research			Second Stage of research						
	Number of Responses	Percent of Responses	Percent of Cases	Mean	Std. Deviation	VR	Importance	Norm-alized weight	Norm-alized weight rating	Rank
Mechanization development of the gardens	6.00	6.38	85.71	4.143	0.690	0.714	0.7500	0.0434	4.3362	10
Suitable for Iranian borage advertising sales and changing consumer tastes	4.00	4.26	57.14	4.143	0.378	0.857	0.7536	0.0436	4.3568	11
Social support services to farmers	4.00	4.26	57.14	4.143	0.378	0.857	0.7536	0.0436	4.3568	11
level of education of Minimum in the world to accept new ideas	3.00	3.19	42.86	4.143	0.378	0.857	0.7536	0.0436	4.3568	12
Give low interest loans to gardeners	3.00	3.19	42.86	3.857	0.690	0.857	0.6893	0.0399	3.9851	13
Total	94	100	1342.86	-	-	-	17.2964	1	100	-

After performing the stages one and two of the study, given the fact that Kendall's W coefficient rate for economic, social, technical, managerial problems and problem solving strategies was 0.297, 0.276, 0.127, 0.138, 0.178, respectively ($p < 0.01$), it represents the rate of agreement among the experts which removes the need to perform Delphi for next stage (table 8).

Table 8. Kendall's W coefficient rate.

Variable	N	Kendall's W[a]	Chi-Square	df	Asymp. Sig.
Economics	7	0.297	18.717	9	0.028
Socio-Cultural	7	0.276	15.453	8	0.049
Technical	7	0.127	4.412	9	0.042
Management	7	0.138	7.732	8	0.046
Strategy	7	0.178	11.502	21	0.052

Conclusions and Recommendations

In general, results indicated that the most important problems confronting the expansion of *Echium amoenum* Fisch and Mey are: failure to define the expert price of *Echium amoenum* Fisch and Mey, lack of active production cooperative societies, lack of properly application of cultivation, maintenance and Harvesting and lack of training, welfare, treatment and employment facilities across the region. Additionally, in line with realization of study objectives, some strategies were suggested by the experts including improving the *Echium amoenum* Fisch and Mey orchards and varieties, increasing the economical cultivated area, constructing processing and packaging companies to raise the products added value, encouraging the farmers to use novel research techniques, providing sustainable, active market places, Guaranteed Purchase, suitable domestic and international marketing and adequate knowledge on the suitable soil and fertilizer for *Echium amoenum* Fisch and Mey.

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