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ORIGINAL ARTICLE

Investigating the variables influencing the application of nonchemical pest control methods in cucumber greenhouses (case study: Pishva County)

Aziz Darvishi*, Sarveh Ahmadi, Mahdi Rasouli

Islamic Azad University, Varamin Unit, Iran
E-mail: Darvishi5173@gmail.com (corresponding author), ahmadi.s.varamin@gmail.com, rasouli322@yahoo.com

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Scientific investigations indicate that the technology expansions and the increases in the uses of additives, pesticides, antibiotics and hormones in the production of foodstuff in the developing countries have been accompanied by adverse and undeniable effects on the humans' health during the recent decades. The present study aims at investigating the variables influencing the application of nonchemical pest control methods in cucumber greenhouses in a case study of the conservatories in Pishva County. The study population included all the Pishva County greenhouse owners who had been solely raising cucumber in 2016 reaching in number to 87 greenhouse owners. According to the limited number of the study population, they were all selected as the study sample volume based on a census sampling method; out of the study population, 83 individuals were at hand. The study instrument was a questionnaire the validity of which was confirmed through inquiring ideas from the university professors and its reliability was also verified based on Cronbach's alpha coefficient within a 79% to 86% range. The results obtained for the collective effectiveness of the independent variables on the dependent variable through taking advantage of multiple regression tests signify that such variables as economic, informational and cognitive and promotional barriers have contributed to greenhouse owners' lack of interest in making use of nonchemical pest control and plant disease management strategies.

Key words: organic agriculture; nonchemical control; cucumber greenhouse owners; Pishva County

Introduction

During the recent decades, there are brought about adverse and undeniable effects on human health in developing countries through the technology expansions and the increase in making use of additives, pesticides, antibiotics and hormones in foodstuff production (Ranjbar Shams and Omidi, 2014). It has been due to the mankind's larger deal of attention paid to the environment that the functionaries have introduced such methods as integrated management styles for a better control of pests and plant diseases. Meanwhile being useful, these methods are more nature-friendly than the other solution. Integrated pest management (IPM) is an effective and environmentally sensitive approach to the pest control that relies on a combination of common methods. Integrated pest management programs take advantage of comprehensive and latest information regarding the pests' life cycles and their interrelationships with the environment (Ofuoku et al., 2009).

The preliminary field investigations are suggestive of the idea that the consumers, unlike the past, are not much inclined to purchase greenhouse cucumber in such a manner that they are more willing to buy field cucumbers for even more prices. This is more than anything else due to the expansion of the public awareness regarding the immethodical use of chemicals and more than standard pesticide residues in greenhouse cucumbers. The per capita consumption reduction of this crop is not only traceable inside the country but it has also been effective on the greenhouse cucumber export to the countries around the globe (Ranjbar Shams and Omidi, 2014).

A great many of modern agriculture supporters assert that if the countries adopt organic methods of producing agricultural products the world will die of famine. They, in scientific communities and through various media, announce that organic agriculture is not sustainable and its yields are increasingly lower than what is produced via modern agriculture. By means of such advertisements, they have succeeded in exerting more pressures for transgenic products, growth hormones, antibiotics, radiation and synthesized chemical substances and justify the use of these latter chemical materials in lieu of the chemicals the risks of which they have accepted. These advertisements and ideations along with the notions proposed by some other experts and policymakers regarding the challenges and problems pertinent to organic agriculture have made the achievement of

organic agriculture difficult or impossible. However, an array of challenges, as barriers to organic agriculture, should be overcome via practical planning so as to pave the way for the entry to organic agriculture (Sharifi Moghaddam, 2009).
Now, according to the daily increasing growth in investment on the production of greenhouse cucumbers in the country, on the one hand, and the gradual shift in the consumers' attitudes from greenhouse cucumbers to field cucumber, on the other hand, the use of nonchemical control methods has been proposed as solutions to get over these problems. Since an individual's tendencies towards a specific topic forms the basis of his or her decisions, thus the current research paper aims at investigating the reasons why the Pishva County's greenhouse cucumber producers do not make use of nonchemical pest control methods and plant disease management strategies.

Materials and Methods

The present study has been conducted based on a descriptive-correlation method. The study population included all Pishva County's greenhouse owners who had exclusively grown greenhouse cucumber in 2016. The total number of study population was 87 individuals all of whom were selected as the study sample volume based on a census method due to the limited number of the study population. Out of this number of study sample volume, 83 greenhouse owners were reachable. The study instrument was a questionnaire the validity of which was confirmed via acquiring the university professors' ideas and the reliability of the questionnaire was found ranging from 79% to 86% through Cronbach's alpha coefficient. To gather the information and codify an instrument tool, there was made use of documents, books, scientific journals, internet sources and notions inquired from the experts of the field. The coefficient of variations, medians, exponents and means were evaluated in the section on descriptive statistics and correlation analysis and regression analysis were applied in inferential statistics section.

Results and Discussion

According to the study results, the average age of the Pishva County's greenhouse cucumber producers was 46 years; the youngest of them was 18 years old and the oldest was 66 years old. Some 94% of the Pishva County's greenhouse cucumber producers were men and 6% were women and 21.7% of them were single and 78.3% were married. In terms of education level, 4.8% of the Pishva County's greenhouse cucumber producers were illiterate, 22.9% could read and write, 14.5% had secondary school degree, 33.7% had diploma, 10.8% had associate's degree, 8.4% had BA degrees and 4.8% had MA and higher degrees. The results of the study indicated that 39.8% of the Pishva County's greenhouse cucumber producers had little relationships and communication with the agricultural specialists and promoters, 25.3% had very little relationships with them, 21.7% had intermediate relationships with these experts, 9.6% had much communication and relationship with the agricultural specialists and promoters and 3.6% had a very high relationship with them.
The study results also showed that the majority of the Pishva County's greenhouse cucumber producers refer to the agricultural administrations when faced with problems in regard of pest controls. The work experience of Pishva County's greenhouse cucumber producers is on average ten years, the shortest of which is three years and the longest is 21 years. Corresponding to the study results, the ownership status of 47% of the greenhouses in Pishva County is privately owned and 53% of the greenhouses are rented.
Products are selected based on such criteria as cost-effectiveness; the majority of the Pishva County's greenhouse cucumber producers make use of pest control methods based on their own personal experiences. The majority of Pishva County's greenhouse cucumber producers believe that price plays a part in pesticide selection to some extent and a great many of them try to exercise patience upon new pesticides' delivery to the market and wait for the other farmers to make use of them and then try using the new pesticides in case that good results are produced.
The study findings are indicative of the idea that the majority of the studied greenhouse owners believe that promotional barriers are effective on their tendencies towards the use of nonchemical methods of pest control and plant disease management. Some 6.3% of the greenhouse owners are of the belief that promotional barriers have little effect on their lack of willingness to make use of nonchemical methods of pest control and plant disease management and 33.8% believe they have intermediate effects and 12.5% know them as very effective on their lack of willingness to make use of nonchemical methods of pest control and plant disease management. The prioritization of the items based on coefficient of variation demonstrated that the most frequent attitudes of the Pishva County's greenhouse cucumber producers regarding the effect of promotional barriers on their lack of tendency to make use of nonchemical methods of pest control and plant disease management respectively are: lack of relationship with the agricultural promoters and specialists, rapid effects of chemicals and observation of the outcomes of chemical use and nonparticipation in training courses on pest management.
The results also highlighted that the majority of the study subjects believe that the economic barriers are largely effective on the greenhouse owners' lack of tendencies towards the use of nonchemical methods of pest control and plant disease management. About 2.8% of them believe that economic barriers have very low effect, 12.5% believe that the economic barriers are of low influence, 29.2% opined that the economic barriers as having intermediate effects and 18.1% believe that economic barriers have very high effects on the greenhouse owners' lack of interest in making use of nonchemical methods of pest control and plant disease management. The prioritization of the items based on coefficient of variation indicated that the most frequent attitudes of the Pishva County's greenhouse cucumber producers regarding the economic barriers influencing the greenhouse owners' lack of inclinations towards the use of nonchemical methods of pest control and plant disease management are the high cost of nonchemical control methods, amount of job income satisfaction and the increase in the crop quality when applying chemicals.

Study Findings signified that the majority of the study subjects believe that the information and cognitive barriers have intermediate effect on the greenhouse owners' lack of interest in nonchemical methods of pest control and plant disease management. About 4.3% of them believe that the information and cognitive barriers have very low effect, 22.9% opine that the information and cognitive barriers have low effect, 27.1% express that the information and cognitive barriers have much influence and 12.9% state that the information and cognitive barriers have very high effect on the greenhouse owners' lack of interest in the use of nonchemical methods of pest control and plant disease management. The prioritization of the items based on the coefficient of variation is suggestive of the fact that the most frequent attitudes of Pishva County's greenhouse cucumber producers regarding the information and cognitive barriers influencing the greenhouse owners' lack of tendencies towards making use of nonchemical methods of pest control and plant disease management respectively are: not having sufficient information about the specifications of pesticides applied; the lack of holding training and promotional courses and lack of group visiting of the greenhouses that produce healthy products.

The study findings are reflective of the idea that the majority of the study subjects agree with the cases put forth regarding the lack of tendencies towards the use of nonchemical pest control methods. The prioritization of the items based on coefficient of variation indicated that the most frequent attitudes of Pishva County's greenhouse cucumber producers concerning the lack of interest in making use of nonchemical methods of pest control and plant disease management respectively are: expensiveness of the nonchemical control methods, greenhouse owners' lack of awareness and information and the lack of holding educational and training courses.

The study findings also indicated that there is a significant and positive relationship between promotional barriers and the greenhouse owners' lack of interest in employing nonchemical methods of pest control and plant disease management. This is consistent with the results obtained by Solaymani Karizmeh (2010), Kirchmann (2010) .

The study findings additionally indicated that there is a positive and significant relationship between the economic barriers and the greenhouse owners' lack of interest in making use of nonchemical methods of pest control and plant disease management. This latter result conforms to the resuls obtained by Ajudani and Mahdizadeh (2009), Rusta et al (2011) and Sarke (2010).

Furthermore, the study findings are reflective of the existence of a negative relationship between the cognitive and informational barriers and the greenhouse owners' lack of interest in making use of nonchemical methods of pest control and plant disease management. This result complies with what was obtained by Karimi (2009), Baba Akbary et al (2008) and Malek Sa'eedi et al (2009).

The study findings indicated that there is no significant relationship between the greenhouse owners' relationship with the promoters and their lack of interest in making use of nonchemical methods of pest control and plant disease management. This result is in accordance with the results obtained in the studies by Ajudani and Mahdizadeh (2009), Reza'ei Moghaddam et al (2010) and Rusta et al (2011).

It is also worth mentioning that no significant relationship was observed between age and the greenhouse owners' lack of interest in using nonchemical methods of pest control and plant disease management, whereas this latter relationship was found statistically significant in the study carried out by Reza'ei Moghaddam et al (2010) and Nwachakwa (2010).

The study findings are suggestive of the idea that there is no significant relationship between work experience and the greenhouse owners' lack of interest in using nonchemical methods of pest control and plant disease management. This result is in harmony with the findings of the studies by Solaymani Karizmeh (2010) and Chouichom and Yamao (2010).

To prioritize the items constituting the variables, coefficient of variation was utilized. According to table (1), inter alia the items of the variable "promotional barriers" in greenhouse owners' lack of interest in using nonchemical methods of pest control and plant disease management, the "lack of communication and relationships with the agricultural promoters and specialists", with a coefficient of variation equal to 0.272, had the highest priority and the "shortage of agricultural specialists and promoters", with the coefficient of variation equal to 0.298, scored the lowest priority.

Table 1. Prioritization of the items pertaining to promotional barriers in greenhouse owners' lack of interest in using nonchemical methods

Priority	Items	Mean	Standard deviation	Coefficient of variation
1	Lack of relations with promoters and experts in agriculture	3.27	0.89	0.272
2	Rapid effects of chemicals and observation of their application outcomes	3.29	0.91	0.276
3	Nonparticipation in educational courses on pest management	3.06	0.87	0.284
4	Other greenhouse owners' negative ideas about nonchemical controls	3.01	0.86	0.285
5	Distantness from agricultural service centers	3.13	0.91	0.290
6	Lack of paying group visits to the greenhouses producing healthy products	3.19	0.95	0.297
7	Shortage of agricultural specialists and promoters	3.12	0.93	0.298

Assessment Spectrum: 1=very low; 2=low; 3=intermediate; 4=high; 5=very high

Economic barriers effective on the greenhouse owners' lack of interest in making use of nonchemical methods of pest control and plant disease management with items' prioritization based on coefficient of variation indicates that the most frequent attitudes of the Pishva County's greenhouse cucumber producers regarding the coefficients of variation, with values equal to 0.175, 0.200 and 0.204, respectively are: expensiveness of nonchemical control, job income satisfaction rate and product quality enhancement in utilizing chemicals.

Table 2. Prioritization of the items pertaining to the variable "economic barriers" to the greenhouse owners' lack of interest in using nonchemical methods of pest control and plant disease management

Priority	Items	Mean	Standard deviation	Coefficient of variation
1	Expensiveness of nonchemical control	4.166	0.732	0.175
2	Job income satisfaction rate	4.303	0.864	0.200
3	Use of chemicals enhances the product quality	4.447	0.910	0.204
4	High finished price of the products	3.492	0.736	0.210
5	The effect of inauspicious market situations and/or shortage of supportive syndicates and cooperative companies	3.909	0.833	0.213
6	The effect of lack of resources and investors in regard of nonchemical methods' application	3.947	0.910	0.230
7	The effect of greenhouse size in making use of nonchemical methods	3.295	0.835	0.253
Assessment Spectrum: 1=very low; 2=low; 3=intermediate; 4=high; 5=very high				

Amongst the items pertaining to informational and cognitive barriers influencing the greenhouse owners' lack of interest in making use of nonchemical methods of pest control and plant disease management, based on table (3), the shortcomings of the information required regarding the specifications of the chemicals applied according to its coefficient of variation being calculated equal to 0.152, has scored itself the highest priority and the lack of familiarity with the novel technologies with a coefficient of variation equal to 0.231 was the least important.

Table 3. Prioritization of the items pertaining to the informational and cognitive barriers influencing the greenhouse owners' lack of interest in making use of nonchemical methods of pest control and plant disease management

Priority	Items	Mean	Standard deviation	Coefficient of variation
1	Shortcomings in the information required about the type of chemicals applied	4.068	0.620	0.152
2	Lack of holding educational-promotional classes	4.053	0.702	0.173
3	Lack of paying group visits to the greenhouses that produce healthy crops	3.901	0.760	0.194
4	Low levels of literacy and awareness	3.863	0.769	0.199
5	Less accentuated role of mass media like radio and TV	3.916	0.829	0.211
6	Consumers' lack of paying attention to product healthiness	3.977	0.920	0.231
7	Unfamiliarity with novel technologies	3.409	0.800	0.234
8	Lack of access to internet	3.575	1.078	0.301

According to the results summarized in table (4), inter alia the items pertaining to the variable "barriers to the lack of interest in making use of nonchemical methods of pest control", the expensiveness of nonchemical control methods, with a coefficient of variation equal to 0.268, scored the highest priority and the crop quality degradation, with a coefficient of variation equal to 0.290, scored the lowest priority.

Table 4. The prioritization of items pertaining to the lack of interests in making use of nonchemical control methods

Priority	Items	Mean	Standard deviation	Coefficient of variation
1	Costliness of the nonchemical controls	3.39	0.91	0.268
2	Greenhouse owners' lack of awareness and information	2.99	0.83	0.277
3	Lack of holding educational courses	3.20	0.89	0.278
4	Consumers' lack of attention to crops' healthiness	3.35	0.94	0.280
5	Degradation of crops' quality	3.79	1.10	0.290
Assessment Spectrum: 1=very low; 2=low; 3=intermediate; 4=high; 5=very high				

In this section there is made use of Pierson and Spearman's correlation test to determine the relationships between the study variables (table 5). In the next stage, stepwise multiple regression method is utilized to investigate the collective effect of the study independent variables' effects on the dependent variable and the three variables of economic barriers, information and cognitive barriers and promotional variables were respectively inserted into the multivariate regression equation.

Table 5. Correlation between the study independent and dependent variables

Row	Independent variables	Dependent variables	Scale	Correlation coefficient	r	P
1	Promotional barriers		Quasi-interval	Pierson	0.307**	0.005
2	Economic barriers		Quasi-interval	Pierson	0.395**	0.000
3	Informational and cognitive barriers		Quasi-interval	Pierson	0.423**	0.000
4	Greenhouse owners' relations with promoters	Lack of tendency to nonchemical control methods	Rank	Spearman	0.112	0.13
5	Age		Quasi-interval	Pierson	0.016	0.88
6	Work experience		Quasi-interval	Pierson	0.155	0.16
7	Education level		Rank	Spearman	0.041	0.71

*=significant in 95% level; **=significant in 99% level

In the first stage, the variable "economic barriers, X1," was inserted into the model which means that the aforementioned variable has the highest effect on the lack of interest in greenhouse owners' lack of interest in utilizing the nonchemical methods of pest control and plant diseases management. In this stage, the coefficient of variation was calculated equal to r=0.697, and determination coefficient was found equal to R^2=0.486 and adjusted determination coefficient was computed equal to R^2=0.482; moreover, F-value obtained from variance analysis was F=130.311 and its significance level was P=0.000 which is found statistically significant in a 0.001 level. Thus, considering the determination coefficient value obtained herein, it can be stated that the aforesaid variable alone accounts for 48.2% of the dependent variable's variations.

In the second stage, after the economic barriers, the variable X2, to wit the informational and cognitive barriers, was inserted to the equation for which a correlation coefficient and determination coefficient and adjusted determination coefficient, respectively, equal to r=0.730, R^2=0.533 and R^2=0.526 were computed; in addition, the F-value obtained from the variance analysis was F=78.193 and the significance level was p=0.000 which indicates that the calculations are significant in a 0.001 level. Thus, based on the extant findings, economic barriers along the informational and cognitive barriers account for 52.6% of the dependent variable's variations.

In the third stage, the variable X3, i.e. promotional barriers, was inserted into the equation after the economic barriers and informational and cognitive barriers for which correlation coefficient, determination coefficient and adjusted determination coefficient respectively were r=0.751, R^2=0.565 and R^2=0.555; also, F-value obtained from the variance analysis was equal to F=58.765 and the significance level selected herein was p=0.000 which means that the results are statistically significant in a 0.001 significance level. Thus, based on the extant findings, the variables economic barriers, informational and cognitive barriers along with the promotional barriers account for 55.5% of the dependent variable's variations.

Table 6. Various stages of independent variables' insertion into the regression analysis

Stage	Variable	R	R^2	Adj. R^2	Std.
1	Economic barriers (X1)	0.697	0.486	0.482	0.687
2	Informational and cognitive barriers (X2)	0.730	0.533	0.526	0.657
3	Promotional barriers (X3)	0.751	0.565	0.555	0.643

References

Ajudani, Z., Mehdizadeh, H. (2009). Feasibility evaluation of organic agriculture development and promotion in Kermanshah Province from the perspective of the agricultural specialists. Researches on agricultural promotion and education, 2(4), 65-73.

Baba Akbary, M., Asadi, M., Akbary, M. (2008). Investigating the consumers' attitudes and the factors influencing the organic crops' agreeableness. Journal of economic research in Iran's agricultural development, 30(1), 133-144.

Chouichom, S., Yamao, M. (2010). Comparing opinions and attitudes of organic and non-organic farmers towards organic rice farming systems in north-eastern. Journal of Organic Systems, 5(1), 25-35.
Karimi, A. (2009). Investigating the factors influencing the organic agriculture development from the perspective of headquarter specialist of Agricultural Jihad Ministry. MA dissertation, Teacher Training University.
Kirchmann, H., Thorvaldsson, G. (2010). Challenging targets for future agriculture. European Journal of Agronomy, 12(3-4), 145-161.
Malek Sa'eidi, H., Reza'ei Moghaddam, K. (2009). Factors influencing the knowledge of agriculture specialists from Khuzestan Province Agricultural Jihad Organization in regard of organic agriculture. Seasonal journal of Iran's economic and developmental studies, 4(2), 81-92.
Nwachukwu, C.A. (2010). Adoption of Organic Agricultural Technologies: Implications for Radio farmer Agricultural Extension Programmers in Imo State, Nigeria. Scientific and Technical Information and Rural Development IAALD XIIIth World Congress, Montpellier, 26-29 April 2010.
Ofuoku, A.U., Egho, E.O., Enujeke, E.C. 2009. Integrated Pest Management (IPM) Adoption among Farmers in Central Agro-Ecological Zone of Delta State, Nigeria. Advances in Biological Research, 3(1-2), 29-33.
Ranjbar Shams, H., Omidi Najaf Abady, M. (2014). Factors influencing the consumers' attitudes towards organic agricultural products in Tehran. Agricultural promotion and education research, 7(2), 51-62.
Reza'ei Moghaddam, K., Malek Saeidi, H., Ajili, A. (2010). Studying the knowledge of Fars Province Agricultural Jihad Specialists of the organic agriculture. Journal of Iran's agricultural education and promotion, 6(2), 49-61.
Rusta, K., Abadikhah, M., Bakhshi, M. (2011). Economic evaluation of the greenhouse cucumber production entities in Birjand County. Journal of sciences and techniques of greenhouse cultivation, 2(7), 9-17.
Sharifi Moghaddam, M. (2009). Principles and requirements of security and health in agricultural products and crops. Tehran, public relations and international affairs of fruit and vegetable markets' organization of Tehran Municipality.
Solaymani Karizmeh, Z. (2010). The role of promotional-educational methods in reduction of chemicals' application and inputs in growing vegetables in Ray County. MA dissertation, agricultural education and promotion, Agriculture and Natural Resources department, Islamic Azad University, sciences and research branch, Tehran.

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