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RESEARCH ON THE IMPORTANCE OF PROFESSIONAL TRAINING AND SPECIALIST ADVICE FOR FARMERS - A STUDY CASE REGARDING PLANT PROTECTION IN TOMATO GROWING IN GREENHOUSES

Steluța LIPIANU, Cristinel Relu ZALĂ, Costică CIONTU

University of Agronomic Sciences and Veterinary Medicine Bucharest, 59, Marasti Boulevard, District 1, 011464, Romania, E-mails: stelutazana@yahoo.com; cristinel.zala@agro-bucuresti.ro; ciontucostica@yahoo.com

Corresponding author: stelutazana@yahoo.com

Abstract

Professional training and consulting systems in the field of plant protection, and not only, are of particular importance for our country in the context of agricultural policies developed at the level of the European Union. The particularities specific to the implementation of community policies in Romania must be reflected in the level of specialization of agricultural specialists regarding their skills. Agricultural consultancy services represent a vital element in the field of informational and technological transfer in agriculture, providing farmers with information that can contribute to improving their standard of living and that of the rural population. From the research carried out, it appears that Romanian farmers need specialized consultancy in three directions: 1) preparation for accessing European Rural Development Program funds; 2) streamlining plant and animal production; 3) facilitating access to consultants on legal issues, cadastre, feasibility studies, marketing, management, etc. The paper also presents results regarding plant protection products used by farmers in Ilfov county in 2020. The purpose of the paper is assess the farmers knowledge where they could find valuable information to their problems regarding plant protection as reflection of their training level and of the efficiency of the consultancy system in Romania.The working method consisted of a sociological survey and an opinion poll. For technical advice, 28.0% of the surveyed farmers would turn to the Agricultural Directorate. For the use of plant protection products, 51.0% of farmers turned to their delivery company. An important shoulder of farmers, 71.0%, are not aware of the National Action Plan regarding the reduction of risks associated with the use of plant protection products. Most of the farmers, 45.0%, would turn to a private consultant to receive support in accessing European Rural Development Program funds.

Key words**:** *consultancy, vocational training, farmers, plant protection in tomato growing*

INTRODUCTION

In the current context, in which ensuring food safety and security are part of the sustainable development objectives that define the 2030 Agenda, increasing the responsibility among farmers and all factors involved in respecting good agricultural practices is a key objective in the sustainable management of environmental resources.

Compliance with good agricultural practices, starting from the transport, storage and actual administration of plant protection products, is a desire of the European Community, and not only that (MADR, 2023) [11].

In this context, it is becoming more and more evident that the integrated management of diseases, weeds and pests in agricultural vegetal crops focuses on obtaining healthy crops through good agricultural practices that aim at the safe application of plant protection products, a fact also reflected in the protection of the environment [13, 14, 15, 23, 24].

Tomatoes are the major vegetable crop in the world with a high importance in human diet, but its growing is facing with various problems especially related to plat protection which claim the advice of an export or consultant.

Disease, weed and pest control techniques attempt to achieve a balance between cost of control and crop yield loss and this control techniques can be selected to meet short-term economic and agricultural planning goals [27].

Plant health is fundamental to the sustainability and competitiveness of agriculture, food safety and environmental protection.

The training of farmers, distributors and consultants with the aim of the sustainable use of plant protection products falls under the observance of the legislative framework in Romania in accordance with the provisions of art. 5 para. (1) from OUG no. 34/2012 [17] for the establishment of the institutional framework of action for the purpose of the sustainable use of pesticides on the territory of Romania and Order no. 1356/1343/2018/51/2019 [18] of the Minister of Agriculture and Rural Development, the Minister of the Environment and the Minister of Health regarding the training and certification system for the sustainable use of plant protection products.

Considering that the training is an obligation of each member state of the European Union, of which Romania is also a part, the users of plant protection products in the agricultural sector (agricultural producers) have the obligation to register at the headquarters of the phytosanitary office in the the county in which it operates.

After training and passing a grid test, farmers receive a professional training certificate attesting to the acquisition of necessary knowledge regarding the sustainable use of plant protection products [12].

Agricultural consultants play an important role in bringing new knowledge and innovations to farmers, as scientists often lack the skills to implement innovations [8, 16].

The primary objective of agricultural consultants is to increase the economic value and net present value of their clients' agricultural business by helping them set realistic business goals and successfully achieve them [3, 7].

The role of consultants is becoming increasingly important as they are involved in a wide range of activities and are employed by farmers for their problem-solving and decision-making abilities [4, 5].

The agricultural consultant requires a full understanding of their clients' business and personal priorities and must have a vision to ensure the greatest increase in production [25], integrating and evaluating the impact of all factors on the whole activity [26].

As farmers come under pressure to comply with an increasing number of environmental rules and regulations, the role of a successful agricultural consultant due to his knowledge will increase [4, 5].

In most agricultural advisory case studies, farmers focused primarily on plant protection issues, followed by technology issues, while environmental issues came last [22].

For this reason, the consultants were involved in making recommendations to help solve some problems when some research in the field of environmental protection resulted in the withdrawal of a certain pesticide. Thus, at some point the majority of consultants and farmers came to the conclusion that the application of insecticides or fungicides in the form of dusts represents an essential problem for the environment and gave up the application of this type of treatment, currently using only phytosanitary treatments by spraying with water [2].

In Romania, as in the whole of Europe, the plant protection products market is regulated by Regulation (EC) no. 1107/2009 [19] of the European Parliament and of the Council of October 21, 2009 regarding the introduction of phytosanitary products on the market. This regulation establishes the rules for authorization of phytosanitary products presented in commercial form, their introduction on the market, use and control within the Community. This Regulation increases the level of protection of health and the environment, contributes to better protection of agricultural production, and enlarges and strengthens the internal market for plant protection products.

For farmers, it is necessary to have both knowledge specific to the agricultural field - e.g. diagnosing and combating diseases or pests, as well as skills related to business management, such as preparing a feasibility study for obtaining a loan.

Especially in these times when there is talk of „smart agriculture", high precision technique, high added value agriculture, but also more and more sophisticated agricultural production

marketing schemes, financial instruments available to farmers - the need becomes obvious for them to have access to all these news and innovations.

All this is all the more relevant in a country like Romania, whose numerous small and medium-sized farms have to produce really intelligently in order to be competitive and to survive on the market.

The pace of changes in the economic, technological or social environment in which farms operate has become, in the 21st century, so fast that farmers and entrepreneurs in the agri-food field need specialized support to keep up and integrate all these new technologies, practices and business models.

The agricultural knowledge and innovation system (Agricultural Knowledge and Information Systems - AKIS) is a concept that encompasses "people, organizations and agricultural institutions involved in generating, storing, transforming, retrieving, integrating, disseminating and using knowledge specific to this field, with the aim of to synergistically support decision-making, problem-solving and innovation in agriculture" [21].

There is no unified AKIS system in the countries of the European Union.

Specifically, each European country has built its own system depending on the institutional structure, the ownership status of research institutions and advisory organizations, the structure of education, sources of funding, the characteristics of farms and farmers - their needs and expectations, as well as and the implementation of the Common Agricultural Policy and national agricultural policies.

Agricultural consultancy represents one of the subsystems of AKIS.

The purpose of the paper is assess the farmers knowledge where they could find valuable information to their problems regarding plant protection as reflection of their training level and of the efficiency of the consultancy system in Romania.

MATERIALS AND METHODS

The working method consisted of a sociological survey and an opinion poll.

The sociological investigation is a method of questioning social facts (opinions, attitudes, motivations, aspirations, personal characteristics and of the social environment) at the level of groups of people of different sizes and which allows the quantification of the data obtained in order to describe and explain them.

The sociological investigation is a complex method that includes various complementary methods: questionnaire, observation and document analysis.

The opinion survey represents a specific form of sociological investigation, being a statistical method of establishing, based on a sampling, the classification of opinions in relation to certain socio-demographic variables of the interviewed population. The opinion poll is based on a questionnaire.

RESULTS AND DISCUSSIONS

Agricultural consulting in Romania appeared only after the fall of the communist regime. Prior to 1989, agriculture as part of the centralized economy was virtually unconsulted in the true sense of the word. There were only specialization courses for the heads of IAS and CAP organized by the County Agricultural Directorates and the Agronomist's House, and these were mostly oriented towards the technical aspects of production [9].

After the Revolution of 1989, Romanian agriculture entered a process of radical restructuring. It was only in 1998 that the foundations of the first organizational structures specialized in agricultural consultancy were laid, subordinated to the Ministry of Agriculture and Rural Development (MADR).

Then the National Agency for Agricultural Consultancy (ANCA) was created within the project financed by the European Commission through the PHARE pre-accession funds, with the aim of providing agricultural consultancy services to Romanian farmers.

At the regional level, the ANCA had under its authority the County Offices for Agricultural Consultancy (OJCA) in the 41 counties of the country, as well as the Agronomist's Houses.

For their part, the OJCAs had in their structure 546 Local Agricultural Consultancy Centers (CLCA) at the communal level [1].

Currently, the agricultural consultancy system in Romania is functional only in the state public system and is represented by a consultancy compartment within the 41 county agricultural directorates (technically and methodologically coordinated by the Ministry of Agriculture and Rural Development), and 450 centers communal technical assistance within the town halls [10].

These centers, which serve a number of 2,685 communes, the total number of these territorial administrative organizations in the country are usually represented by a single agronomist engineer from the town hall [10].

The issue of human resources in agricultural consultancy can no longer be ignored: now one agricultural consultant in the public system serves 12,000-13,000 farmers on the APIA farmer lists.

The experience of European states shows that an optimal ratio would be 1 consultant to 65-100 farmers.

At the level of Ilfov county, there are 41 communes and no Agricultural Consultancy Center.

Also, there is no private Agricultural Chamber in Ilfov County.

The Directorate for Agriculture of Ilfov County offers agricultural consultancy through the Service for the implementation of policies, strategies in agriculture and the food industry, agricultural consultancy and professional training.

At the agricultural consultancy and professional training department, a number of 2 employees are employed.

In Ilfov county, there are approximately 2.200 farmers who submitted payment requests to APIA.

During the years 2020, we undertook meeting sessions with a number of 364 small farmers from Ilfov county, the vegetable growers who grew tomatoes in the solar system.

In Ilfov county, vegetable farmers are the majority in the Southern extremity of the county, on the border with Giurgiu county and south of Bucharest, on the banks of the Sabar river, 81.37% of vegetable farmers are from the Vidra vegetable basin. The rest of the participating vegetable growers are from: Nuci (5.76%), Gruiu (4.67%), Copăceni (3.57%), Măgurele (2.19%), 1 Decembrie (0.82%), Berceni and Chitila (0.54% each), Jilava and Brănești (0.27% each). All the farmers had to fill out the holding sheet, where they declared the area of land owned and the phytosanitary treatments they applied.

Regarding the plant protection products applied to tomatoes in the greenhouse (Table 1), it can be observed that 43.0% of the farmers applied treatments against the *Pythium ultimum* pseudofungus (EPPO)[6].

Against leaf and fruit diseases of tomatoes, caused by different phytopathogenic agents, all surveyed farmers applied a number of 8 fungicides (Swhicth 62.5WG, Signum, Teldor, RidomilGold 68, Merpan 80 WDG, Cabrio Top, Polyram DF and Ortiva Top).

Table 1. Tomato treatments in the solarium

The culture stage	Damage agent/ stimulating	The product used/ strength (%)	Farmers (%) who applied the treatment
Seedling	*Pythium ultimum*	Previcur Energy-0.1	43.0
Floors 1-2-3 flowers and fruits	*Botrytis cinerea*	Swhicth 62,5WG-0.1	100.0
		Signum-0.15	
		Teldor-0.08	
	Phytophthora infestans, Fulvia fulva, Septoria lycopersici, Alternaria sp.	RidomilGold 68WG-0.25	100.0
		Merpan 80 WDG-0.15	
		Cabrio Top-0.2	
		PolyramDF-0.2	
		Ortiva Top-0.1	
	Tuta absoluta	Coragen-0.0175	40.0
	Helicoverpa armigera, Liriomyza trifolii	Mospilan 20 SP-0.04	25.0
		Affirm-0.15	
		Laser 240 SC-0.05	
	Mites	Vertimec 1.8 EC-0.08	11.0
	Stimulating	Atonik-0.06	24.0
		Cropmax-0.2	4.6
Before planting seedlings	Weeds	Sencor 600 EC-0.35 l/ha	3.0

Source: EPPO [6].

Regarding the treatment against pests, 40.0% of vegetable growers applied treatments against *Tuta absoluta* and 25.0% against the species *Helicoverpa armigera* and *Liriomyza trifolii*.

To combat mites, 11.0% of vegetable growers applied Vertimec 1.8 EC.

Regarding the applied growth stimulants, 24.0% of farmers applied Atonik, and 4.6% applied Cropmax.

Only 3.0% of tomato producers herbicided with Sencor before planting seedlings.

The number of treatments carried out during the vegetation period of the tomato crop varied from one vegetable grower to another. Thus, 24.5% of the farmers applied 5, respectively 6; 21.0% applied 7 treatments; 15.0% of producers applied 4 treatments each; while 8 treatments applied 6.0%, 9 treatments applied 4.5%, 3 treatments applied 1.5%, 10 treatments applied 1.5% and 11 treatments mentioned 1.5% of farmers.

For questions (1-4) addressed in the questionnaire, the answers (%) were as follows:

Question 1. „***If you need technical advice in agriculture, who would you turn to***?".

Of the interviewees, 28% answered the Agricultural Directorate, 25% indicated newspapers, television and the Internet, 19% a private consultant/consulting firm, 17% a supplier of raw materials, another 10% would ask a more experienced neighbour or friend, and 1% would turn to an agricultural university/college/research center (Figure 1).

Question 2. ***„If you need information on the use of plant protection products, who would you turn to?"***.

The selected vegetable farmers answered: 51% a supplier of raw materials, 18% indicated newspapers, television and the Internet, 10% of respondents said the Agricultural Directorate, 10% answered the National Phytosanitary Authority, 9% would ask a more experienced neighbour or friend, and 2% would turn to an agricultural university/college/research center. This reflects the fact that the relationship with the distributor agent of plant protection materials or other products of interest for farmers is very strong.

The farmers are afraid to ask an advice from other sources (Figure 2).

Question 3. ***„Do you know the National Action Plan regarding reducing the risks associated with the use of plant protection products?".***

71% of the farmers answered that they had not heard, and 29% know that there are actions to reduce the risks associated with the use of plant protection products.

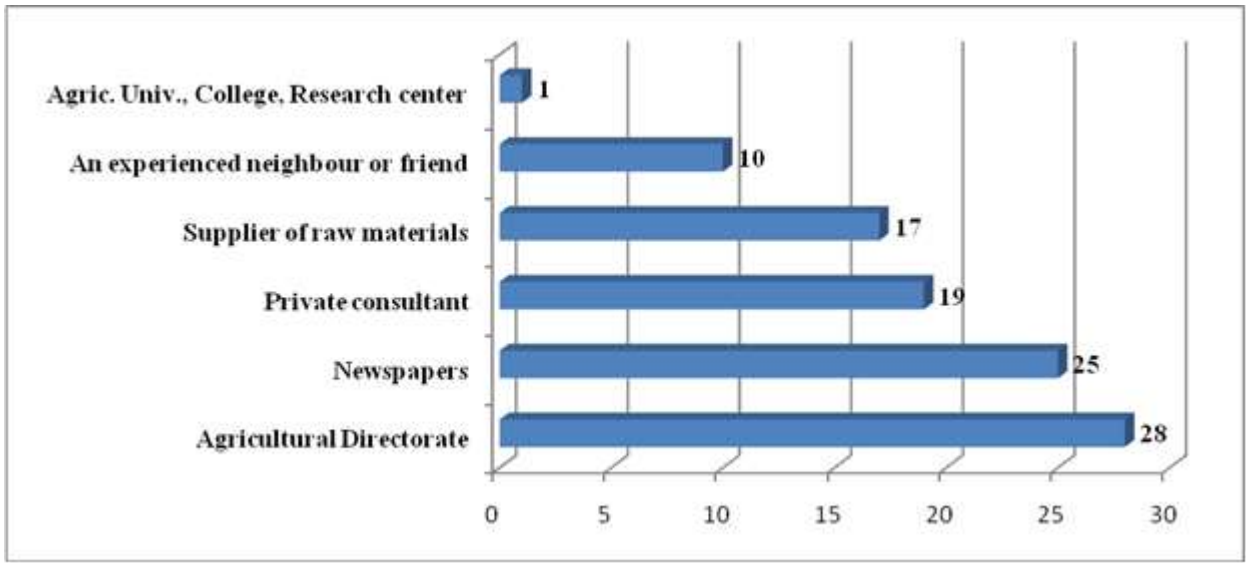

Fig.1. Farmers' answers to Question 1: "From where the farmers ask for technical advice?"
Source: Own results based on the Field Survey, 2023.

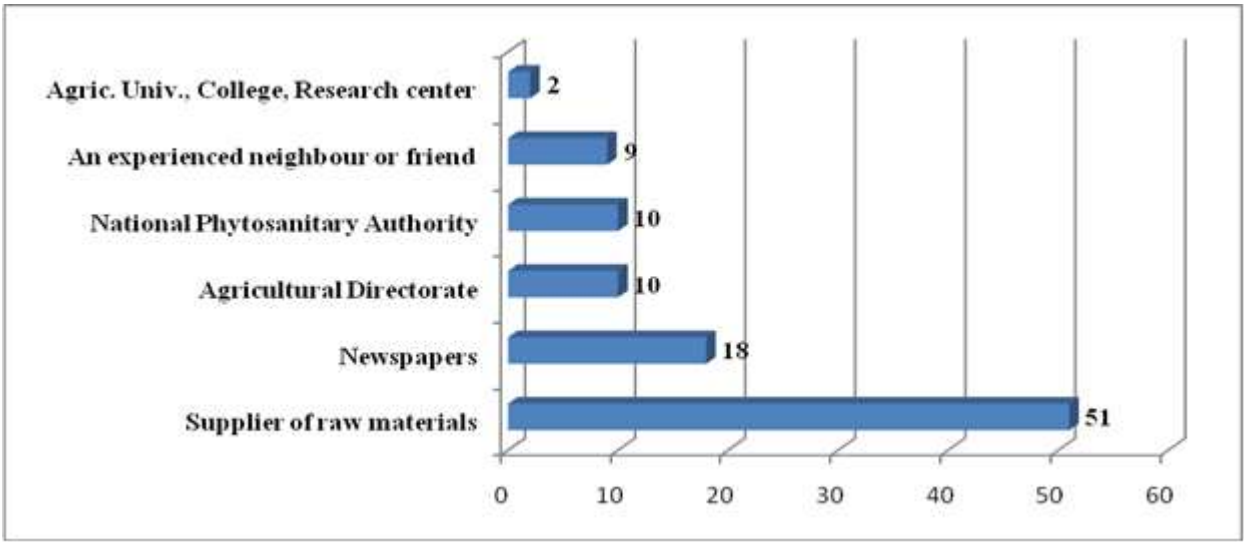

Fig. 2. Farmers' responses regarding to whom the they turn to get information of interest
Source: Own results based on Field Survey, 2023.

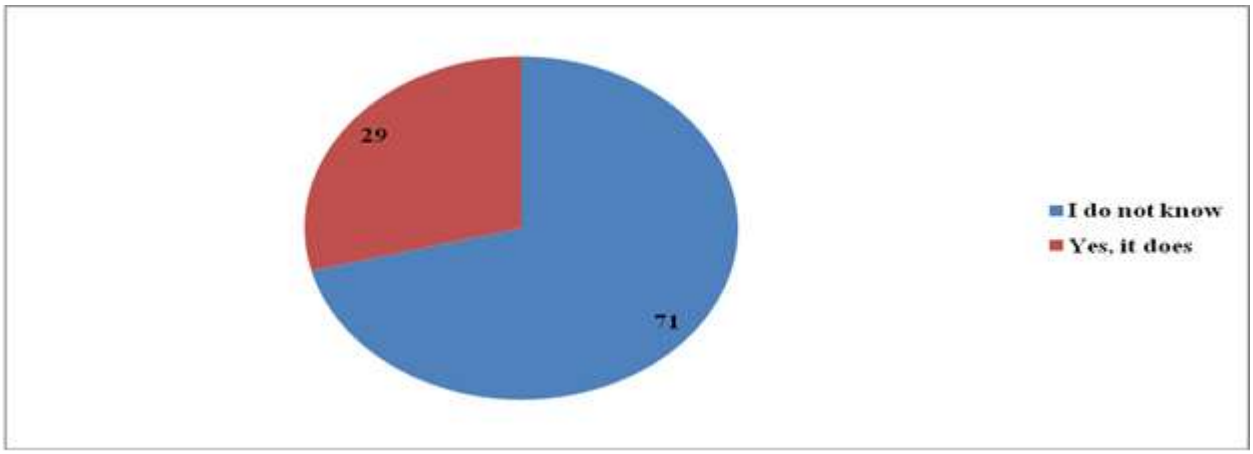

Fig. 3. Answers to Q3- Does the National Action Plan provides information on the risks linked to the use of plant protection products?
Source: Own results based on Field Survey, 2023

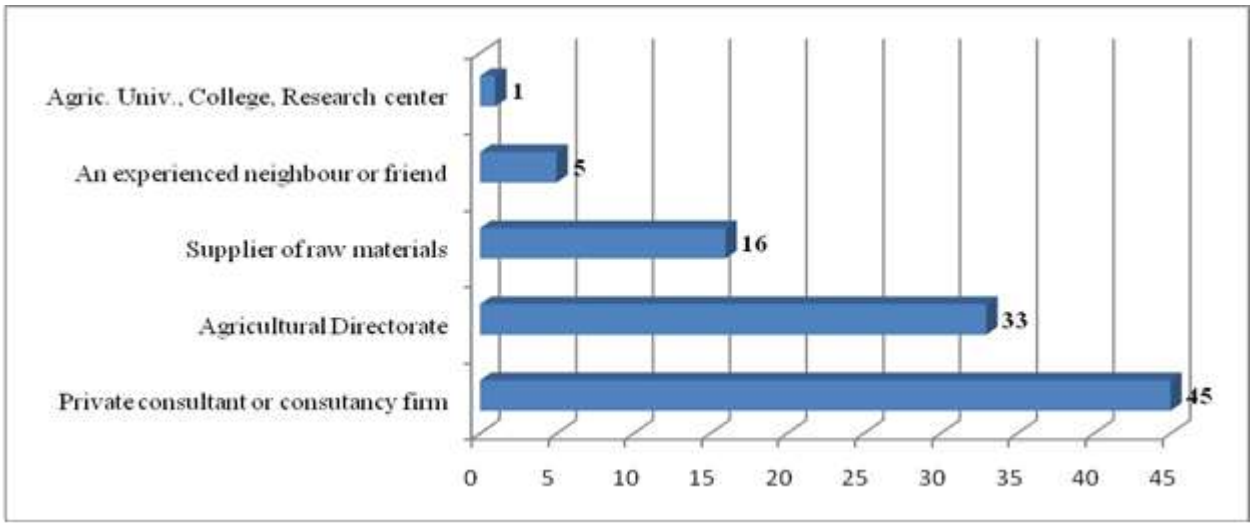

Fig. 4. Farmers' answers to Question 4: 'From whom they could ask for support for accessing European funds for rural development?"
Source: Own results based on Field Survey, 2023

The lack of information regarding the risk of using chemicals for plant protection reflects that the National Action Plan is not sufficiently promoted among farmers (Figure 3).

Question 4. *„If you need support for accessing European Rural Development Program funds, who would you turn to?”.*

Of the respondents, 45% answered a private consultant/consulting firm, 33% of them indicated the Agricultural Directorate, 16% would address a supplier of raw materials, another 5% would ask a neighbour or a friend who has already accessed European funds, and 1% would turn to an agricultural university/college/research center (Figure 4).

CONCLUSIONS

In Romania, assessments of farmers' needs regarding agricultural consultancy services are needed, both from the point of view of the content of the consultancy: information, training needs, as well as of the preferred sources: which entities do they turn to, what do they trust, etc.

Consultancy must be accessible and within the physical proximity of the farmer.

The reconstruction of a functional and efficient agricultural consultancy system is a priority, not only from the perspective of the development needs of farmers, but also from the very access of Romania to the future funds for agriculture post-2020.

Agricultural consultancy services represent a vital element in the field of informational and technological transfer in agriculture, providing farmers with information that can contribute to improving their standard of living and that of the rural population [9].

Once a farmer has decided to engage the services of a crop protection consultant, in this case, they expect that consultant to be experienced, highly skilled and up-to-date with the latest technologies, which have the ability to ensure a qualitative (due to the use of, for example, biological insecticides) and quantitative (by saving possible losses caused by different biotic factors: phytopathogenic microorganisms, insects) production increase.

Regarding the fungicides and insecticides used to prevent and combat the attack of diseases and pests, all the vegetable growers interviewed applied approved products and in the recommended doses and concentrations; also, they respected the rest period between the last treatment and the start of harvesting.

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