SUMMARY

Title of the PhD thesis: *"RESEARCHES ON THE SUSTAINABLE AGRICULTURE LEVEL IN IRAQ AND PROPOSALS ON ITS DEVELOPMENT WAYS, BASED ON THE SUSTAINABLE AGRICULTURE EXPERIENCE FROM ROMANIA" elaborated by PhD. Eng. HUSSEIN ALI HUSSEIN AL-QAESI, Professor, Ph.D. Drăghici Manea, 2018, USAMV Bucharest*

KEYWORDS: Sustainable agriculture, indicators, methods, agricultural system, specific indicators, systemic indicators, economic indicators, social indicators, statistical indicators, average, standard deviation, sustainable agriculture, environmental sustainability, pollution, innovation, bioeconomics , coefficient of variation, confidence limits , probability, risk, Hi^2 , significance, questionnaire, respondents, Iraq, Romania, development, climate, flora, fauna, irrigation, gas emissions, fertilizer use, herbicides, petroleum, education, research, ecological agriculture, organic operators, ecological areas, eco / bio products , trade fairs, support, measures, results, conversion stages, project.

The research undertaken in this PhD Thesis aims primarily at a global assessment of all specialized studies regarding both the sustainable development and sustainable agriculture, and secondly in measuring and evaluating the level of sustainable agriculture between Iraq and Romania . Sustainable development with a focus on sustainable agriculture is a field of global interest, the studies included in this paper demonstrate the actuality of the issues contained in the paper.

We chose this theme, being guided by the following motivations: it is necessary to ensure sustainable development; there is a need to ensure sustainable agriculture; knowledge of the agriculture prerequisites and sustainable development indicators of both countries and their role in the future of sustainable agriculture; role that agriculture plays in the economy and society of Romania and Iraq; setting up a sustainable ecological farm model in Iraq based on the experience gained in Romania.

Sustainable development can be summarized at „the necessity to meet today's needs without compromising on those of future generations". Being considered a continuously moving process, sustainable development presupposes the preservation and protection of the natural environment, agriculture being one of the sectors economic actors most involved in such a process.

That is why agriculture is greatly affected by some endogenous and exogenous factors that endanger the premises of sustainable development. All these are studied in detail in the five chapters of the paper, finalized with a separate chapter consisting of conclusions and recommendations.

Chapter I entitled ***"Sustainable Development of Economic Activities"*** contains an encyclopedia of sustainable development definitions, notions, concepts and studies , focusing on the main elements without which the concept of sustainability cannot exist, the importance of the agricultural extension in sustainable development and last but not least the main objectives of sustainable agriculture.

It is necessary to have in mind that sustainable development is based on society that develops its economic and social system so that the natural resources used and the support systems of life are maintained.

The main objectives of sustainable development are: eradication of poverty and hunger; health and well-being for all; the right to education; gender equality; sustainable economic growth; reducing inequalities between countries; actions to combat climate change; sustainable use of water, soil, forests and marine resources; combat desertification; strengthening the global partnership for sustainable development.

The first chapter includes 26 bibliographic references that include specialized studies, articles, annual official reports, books, international and official publications.

In the second chapter **"Indicators and methods of analysis and research of sustainable development in agriculture"** are included the study indicators and methods of analysis from the paper.

Thesis studied the size of indicators that characterize sustainable development and assessed their role and level.

The paper makes a quantification of the indicators that measure sustainable development at an overall level and at agriculture level and assess the level of development of the two countries Iraq and Romania to improve sustainable agriculture activities.

The indicators analyzed in the paper, which characterize the sustainable development of the economy, generally refer to: gas emissions (m3 CO2 / site); share of fossil fuel consumption (% of total); energy consumption in petroleum equivalent (kg of oil / 1000 USD PPP 2011); consumption of renewable fuels and waste (% of total energy); the number of researchers per 1 million inhabitants; share of spending on research and development; GDP per capita (constant PPP 2011 international); share of natural resource rent in GDP.

The indicators analyzed in the paper, which characterize the sustainable development of agriculture, in particular, refer to: the share of lands set up for irrigation in the agricultural area; coverage of forests and permanent crops; population evolution; the arable land area per person; CO2 emissions per hectare of agricultural land; quantities of chemical fertilizers (NPK), per 1 hectare of

arable land; the quantities of pesticides per 1 hectare of arable land; emissions of nitrogen oxides (% of total); the share of methane emissions (% of total).

These indicators of development in general and for agriculture in particular, are analyzed comparatively for Iraq and some Arab countries and comparatively for Romania and some European Union countries. The comparison is made statistically for the size of these indicators towards Iraq and Romania, and the differences towards other countries are estimated for 0.95 (*), 0.99 (**) and 0.999 (***) probabilities.

The analysis was completed by the statistical indicators of the significance of sustainable agriculture: Average achieved during the analyzed period; The standard deviation (* x); Confidence limits for different degrees of risk; Coefficient of variation (C%); Percentage increase in production over a reference year; Production function.

Last but not least, the case study was explained and the usefulness of the questionnaire, which was applied to 55 people in the Chabaish District , Dhi Qar Province of the Republic of Iraq. The questionnaire was made by interview and addressed directly to the individuals and legal entities involved. In the evaluation of the survey data, the association test was used (Chi, Hi or $\chi 2$, theoretically).

Chapter 3 entitled ***"The analysis of agriculture in the Republic of Iraq"*** analyzes in detail all aspects related to the agriculture of the Republic of Iraq. The chapter begins with an insight into the past of the country's agriculture and natural conditions, highlighting the existence of the areas in which it must be intervened in order to be able to talk about development in this sector. The climate of Iraq is not all over the country favorable to agriculture, which is why it is always seeking to develop projects to help increase production, such as surface enhancement projects with irrigation facilities, unfortunately some of which have negative repercussions for the area's population , fauna, flora, the entire ecosystem (marsh drainage projects). According to the latest statistics, the agricultural area of the country has decreased, of which the arable land is only 11.8% of the total area. It is trying to increase the irrigated surface because water is an important problem in Iraq, without irrigation the crops have very small production or not at all in certain areas.

From the analysis of the sustainable development indicators in Iraq have resulted several very important issues, namely: from the Arab countries surveyed, Iraq has the smallest emissions of gas and oxides, the trend being a declining one; the quantities of fertilizers and pesticides used are also well below the level of other countries, but they are because of the development of sustainable agriculture but rather in the high cost of purchasing these materials; decreases are also seen in the

consumption of renewable fuels and wastes, the share of Iraq being very small, being a minus in sustainable development.

The second part of chapter three consists of a case study conducted in the province DhiQar, Chabaish District. This area is recognized for a more intensive agriculture, soils and the climate are more favorable to the development of agriculture.

In the we have crops with corn, millet and lentils, wheat, barley, vegetables are grown on smaller areas, and the livestock sector consists of cattle, goats, sheep and camels.

The questionnaire was based on the following main aspects: areas exploited in the ecological system, endowment of farms according to sustainable agriculture; farmers' information and skills related to sustainable agriculture; farmers' perception of the advantages and constraints of organic farming.

From all this, a medium to high level of assimilation and awareness of information on sustainable agriculture with a poor but endowed quality of the farms emerged. Overall perception is a very good one about sustainable agriculture, many farmers being the supporters of the benefits it brings. There are, however, a number of constraints farmers face when it comes to organic farming, the most precarious being the unstable market and non-existent legislation.

The paper continues with **"The analysis of agriculture in Romania "** in Chapter ***4,*** which shows tremendous agricultural potential that it has. The chapter begins with a brief description of the natural conditions, and the share of arable land is 39.4%, 3.3 times the area in Iraq. However, the irrigation regime is underdeveloped, the years after 1990 meant a regress in agriculture with irrigation systems, the surface area being 3149.1 thousand ha, but the irrigated ones actually represent only 5%.

Just as in the case of Iraq, Romania has the lowest values among the European countries studied on gas emissions, but with an increase in the consumption of renewable fuels and waste, with a large share of the total. There are also increases in R&D expenditure and decreases in unemployment and low education. All this shows a positive evolution of the sustainable development indicators in Romania.

Regarding the organic agriculture in Romania, it benefits from a professional association formed in 1997, which in the year 2017 amounted 3780 farmers in the vegetal and livestock sector.

There is well-established legislation that complies with EU regulations, formulated and approved in 2000, with additions over the years. The aid granted to farmers comes in the form of subsidies given by the NRDP. On the whole, it can be said that the organic farming sector in Romania has developed dynamically in the last years, yet having a lack at the processing, packaging and

marketing points as well as in the promotion of consumption, so farmers are forced to export the productions.

Chapter 5 **"Project for the development of a sustainable agriculture system in Iraq based on the experience of agriculture in Romania"** begins by describing the basic steps to be followed in order to establish an organic farm, analyzes in detail the market of organic farming in Romania and describes crop technologies, with the main amendments and materials used in crops to meet ecological certification.

At the end of the study, based on the experience in Romania, proposals were made for the establishment of a sustainable crop production farm, to be a training place for students, farmers and teachers.

The proposed conversion farm is in Iraq, in the governorate Dhi Qar and has an arable land of 500 hectares, which proposes the ecological cultivation of wheat, barley, corn, chickpeas and lentils. Taken as examples are the technologies designed by the Research Institute for the Economy of Agriculture and Rural Development in accordance with the information taken from visits to INCDA Fundulea and other organic farms.

Cultivation technologies, cropping, consumption and expenditure are established, but also the capitalization of production, thus calculating all technical and economic indicators at the crop level and across the surface.

The proposed project has a high value in converting a conventional farm into an organic farm, demonstrating the steps to be followed, the materials used, the crop rotation and the economic result that can be achieved, a good result, although the estimated outputs are at an average level.

The paper finishes with a series of conclusions aimed at giving an overview of the research undertaken and its results, as well as proposals aimed at improving the study of sustainable development, organic agriculture in Romania and Iraq.