Assessment of Greenhouse Management in the Northern West Bank: Rationalizing Fertilization Programs for Tomatoes, Cucumbers, and Sweet Peppers

Jamil Harb

Palestine Economic Policy Research Institute (MAS)
Assessment of Greenhouse Management in the Northern West Bank: Rationalizing Fertilization Programs for Tomatoes, Cucumbers, and Sweet Peppers

Jamil Harb

2019
The Palestine Economic Policy Research Institute (MAS)

Founded in Jerusalem in 1994 as an independent, non-profit institution to contribute to the policy-making process by conducting economic and social policy research. MAS is governed by a Board of Trustees consisting of prominent academics, businessmen and distinguished personalities from Palestine and the Arab Countries.

Mission

MAS is dedicated to producing sound and innovative policy research, relevant to economic and social development in Palestine, with the aim of assisting policy-makers and fostering public participation in the formulation of economic and social policies.

Strategic Objectives

- Promoting knowledge-based policy formulation by conducting economic and social policy research in accordance with the expressed priorities and needs of decision-makers.
- Evaluating economic and social policies and their impact at different levels for correction and review of existing policies.
- Providing a forum for free, open and democratic public debate among all stakeholders on the socio-economic policy-making process.
- Disseminating up-to-date socio-economic information and research results.
- Providing technical support and expert advice to PNA bodies, the private sector, and NGOs to enhance their engagement and participation in policy formulation.
- Strengthening economic and social policy research capabilities and resources in Palestine.

Board of Trustees

Mohammad Nasr (Chairman), Ismail El-Zabri (Deputy Chairman), Magda Salem (Treasurer), Lana Abu Hijleh (Secretary), Bassim S. Khoury, Haitham Zoubi, Khaled Osaily, Maher Masri, Mohammad Mustafa, Nafez Husseini, Ola Awad, Saleem Tamari, Sam Bahour, Nabeel Kassis (Director General of the Institute - ex officio member)
Assessment of Greenhouse Management in the Northern West Bank: Rationalizing Fertilization Programs for Tomatoes, Cucumbers, and Sweet Peppers

**Researcher:** Dr. Jamil Harb

**Associate Researchers:** Dr. Hala Shua'ibi
Dr. Munqeth Shtayeh

**Assistant Researchers:** Thafer Salhab
Mohammad Omri
Sofia Rizqallah

**Research Assistants:** Dalia Abu Thaher
Bayan Shamasneh

This study was funded by The Arab Fund for Economic and Social Development

Palestine Economic Policy Research Institute (MAS)
Jerusalem and Ramallah

In the past few years, Palestine Economic Policy Research Institute-MAS has dedicated a good part of its attention to agriculture as one of the vital Palestinian economic sectors and has produced and published several studies on agriculture and food security. The present study focused on the potential for transition to organic agriculture. The researchers found that the Palestinian farmers use chemical fertilizers at too high rates, which has serious consequences on the health of local consumers and is certainly a main reason for low exports. The authors raised a technical question of what would be the optimal plans for fertilizing crops, taking into consideration both the plant species and the region where they are cultivated should farmers not turn to organic farming and continue to use chemical fertilizers. Considering the importance of health, environmental and economic consequences of flawed fertilization plans, MAS undertook to conduct a study, which would enable it to give the necessary warning if warranted by the results, and estimate the economic loss resulting from the overuse of fertilizers, and the possible financial savings that can be achieved if optimal fertilization is adopted.

While we realized that providing answers to these questions requires specialized biochemical testing that takes us to areas beyond the Institute's usual research scope, we have tried through this exploratory research to provide a tentative answer that would initiate a discussion that can help design policies of importance to public health, the ecology and the economy. Exploring the health and environmental effects will be left to academic departments that are equipped to do this sort of investigation. In carrying out this limited study the research team nevertheless needed to resort to specialized laboratories and has spent the summer of 2018 in Weihenstephan-Triesdorf University of Applied Sciences in Germany for this purpose. The task of the team was made possible thanks to the memorandum of understanding between MAS and Birzeit University, who consequently facilitated the task of the main researcher who is one of its faculty.

The study arrived at important findings and proposed short and long-term solutions to the problems associated with excessive use of...
chemical fertilizers. We hope these findings will be of relevance for decision-makers, farmers and researchers. The economic ramifications of the overuse of fertilizers merit attention as they represents a lower limit, quantitatively, because of the limitations to which the study was subjected, and because only the direct effect of excessive fertilization was considered. This shouldn't be a problem since the purpose of this study was to identify trends. Undoubtedly, improving the quality of agricultural yield, and thus export opportunities, will have a positive economic impact besides the financial savings due to the proper use of chemical fertilizers.

On behalf of MAS, I would like to thank the research team for their effort. I also extend my sincere thanks to the Arab Fund for Economic and Social Development for supporting the MAS’ research program and funding this study as part of its contribution to the development of the Palestinian economy.

Nabeel Kassis, PhD
Director General
Abstract

The excessive use of agrichemicals is considered an important issue, particularly in developing countries. An important part of this problem is associated with cultivating plants through the use of non-organic chemical fertilizers, which can arise from the lack of strong infrastructure in charge of examining soils and plant tissues. In addition, sufficient knowledge about fertilization in accordance with local conditions is essential in determining the optimum types of fertilizers and the appropriate quantities for their utilization.

This study was initiated to determine the efficiency of the fertilization programs currently implemented by Palestinian farms. Initially, three types of plants were chosen from greenhouse agriculture (tomatoes, cucumbers, and sweet peppers) and four geographical areas were selected (Qalqiliya, Tulkarem, Jenin, and Jericho). For each species and each region, three farms were singled out. Soil samples were taken before, during, and at the end of the growing season, as well as fully-grown leaves. All samples were dried and grinded in preparation for analysis of their mineral composition. Furthermore, the soil pH and salt content (electrical conductivity) of soil samples were measured. Lastly, information on fertilization programs currently used by farmers was collected.

The results showed that the level of certain nutrients in the soil (specifically phosphorus and magnesium) were very high, while the plant tissue tests showed that the nitrogen content was high. The results also demonstrated a significant problem in the balance of microelements. The results determined that Palestinian farms are using large quantities of non-organic material and chemical fertilizers, which contributes to the poor performance of the currently implemented fertilization programs, while generating high costs and being harmful to cultivated products, soils, and being detrimental to human health. Moreover, such deficiency in the quality of used products leads to a problem of imbalance between mineral nutrients, especially between micronutrients, which may have a negative impact on the growth and development of the plants.
Accordingly, the study’s recommendations include short and long-term solutions. Among these are the establishment of proper infrastructure for performing analyses of soil and plant tissue samples in order to help farmers design balanced fertilizer programs. In addition, the provision of extension officers in the field of plant nutrition is highly needed.

This study concludes that Palestinian farmers use excessive amounts of chemical fertilizers, which entails economic losses exceeding $US7 million. Such inadequate use of chemical fertilizers has negative repercussions not only on soil health, but on consumers’ well-being as well. Consequently, there is an urgent need for further studies to optimize the addition of nutrients to cultivated plants.