



Influence of intensive agriculture in greenhouse on ground water quality

Avshalom Babad (1), Naftali Lazarovitch (2), Daniel Kurtzman (3), and Ofer Dahan (1)

(1) Zuckerberg Institute for Water Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel . (babad@bgu.ac.il), (2) French Associates Institute for Agriculture and Biotechnology of Drylands, Ben-Gurion University of the NegevMidreshet Ben-Gurion, Israel ., (3) Institute of Soil, Water and Environmental Sciences, The Volcani Center, Bet Dagan , Israel

Modern intensive agriculture in greenhouses implements excessive amounts of agricultural inputs as fertilizers, pesticides and irrigation water to prevent lack of essential nutrients. As such, excess fertilizing component which are used by the plants may be easily transported by percolating water through the vadose zone to ground water. In the recent years with the increasing demand for fresh vegetables, a new approach of Organic agriculture is rising. In the Organic approach, fertilizer and pesticides is mainly from organic sources. These organic food products considered to be healthier for human consumption. Furthermore, Organic agriculture is perceived by the public less harmful for the environment. However, latest studies indicate that the excessive use of manure from organic source as fertilizer in agriculture may have negative influence on the ground water quality.

The potential influence of intensive agriculture in greenhouses was studied in two sites that specialize in growing vegetable in two different agro-technical regimes, organic and conventional. Both greenhouses are located at the southern part of the coastal plain of Israel, with very similar climatic and geological conditions. The vadose zone underlying each greenhouse was instrumented with a monitoring system (VMS) allows continuous measurements of the sediment water content and frequent sampling of the vadose zone pore water at multiple points.

Primarily results from continuous monitoring at the two greenhouses shows that the nitrate concentration in the vadose zone underlying the organic growing greenhouse is significantly higher compare with that conventional growing greenhouse, 880 mg/L and 460 (mg/L), respectively. Moreover, the vadose zone water content profile under the organic greenhouse is much wetter compare with that of the conventional greenhouse, due to intensive irrigation sessions that take place in the beginning of each growing season that is required for activation of the compost fertilizers while the plant are to small and do not use most of the fertilizer.

Using organic manure as the main nutrient source in the organic agriculture approach can be the reason for the significant high nitrate concentration under this green-house. In order to transform to basic available nutrient, the organic manure has to go through several microbiological process. The existence of this process is variable by several other parameters such as temperature and soil moisture. For that reason, the efficiency of nutrient release can vary in time. This could lead to gap between the nutrient release and the nutrient uptake by plants.