WATER UTILIZATION OF VEGETABLES GROWN UNDER PLASTIC GREENHOUSE CONDITIONS IN ANKARA USING NEUTRON PROBE TECHNIQUE

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In order to find suitable varieties of tomato, pepper and cucumber for plastic greenhouse conditions in Ankara and ensure both higher yields and lower NO_3 leaching greenhouse experiments were conducted for three years. In the first year (2001) of the experiment four different varieties from each vegetable, namely, Tomato (Ecem F_1, 9920 F_1, 2116 F_1 and Yazgı F_1), Cucumber (Hızır F_1 , Rapido, Hana, and Luna) and Pepper (1245 F_1, 730 F_1, Serademre 8 and 710 F_1) had been grown in the plastic greenhouse using drip irrigation-fertiligation system. Yazgı F_1 variety for tomato, Hızır F_1 variety for cucumber and Serademre 8 variety for pepper were chosen to be suitable varieties to grow in the plastic greenhouse conditions in Ankara.

One access tube in each N_3 and N_0 treatment plots of tomato, cucumber and pepper in 2002 and 2003 experiments were installed for the soil moisture determinations at 30, 60 and 90 cm depths. Readings with the neutron probe were taken before planting and after harvest for the water consumption calculations using the water balance approach and the WUE was calculated on the basis of the ratio of dry matter weight to the amount of water consumed.

Tensiometer and suction cups were installed at 15, 30, 45 and 60 cm depths only to N_1, N_2 and N_3 treatments plots of each vegetable in 2002 and 2003. Tensiometer readings were taken just before irrigation. Also, soil solution samples from suction cups were taken at final harvest and NO_3 determinations were done with RQFLEX nitrate test strips.

Significantly higher yields and WUE values were obtained when the same amount of N fertilizer is applied through fertigation compared to the treatment where N fertilizer applied to the soil then drip irrigated. The nitrate concentrations of the soil solution increased as the N rates increased and no NO_3 had been found in the soil solution taken from 75 cm soil depth, indicating that no leaching of N fertilizer occurred beyond 75 cm soil depth.

Economical analysis showed that the highest profit would be made when tomato is grown instead of cucumber or pepper.

NUCLEAR TECHNIQUES USED IN SOIL FERTILITY AND PLANT NUTRITION

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Nuclear techniques, which include the usage of radioactive and stable isotopes, had been used in soil fertility, plant nutrition, plant breeding, plant protection and food preservation

research works after 1950s. Ultimately these nuclear techniques contributed greatly in increased plant production. In general, it is possible to separate the nuclear techniques used in soil fertility and plant nutrition into to groups. The first group is the use of radioactive and stable isotopes as a tracer in order to find out the optimum fertilization rate of plants precisely. The second group is the use of neutron probe in determining the soil moisture at different periods of the growing season and at various soil depths precisely without any difficulty.

In research works where conventional techniques are used, it is not possible to identify how much of the nutrient taken up by the plant came from applied fertilizer or soil. However, when tracer techniques are used in research works it is possible to identify precisely which amount of the nutrient taken from fertilizer or from soil. Therefore, the nuclear techniques are very important in finding out which variety of fertilizer and how much of it must be used.

The determination of the soil moisture is very important in finding the water needs of the plants for a good growth. Soil moisture contents changes often during the growth period, so it must be determined very frequently in order to determine the amount of irrigation that has to be done. Conventional soil moisture determination (gravimetric method) is very laborious especially when it has to be done frequently. However, by using neutron probe soil moisture determinations can be done very easily any time during the plant growth period.

RADIOCHEMICAL NEUTRON ACTIVATION ANALYSIS OF ZIRCONIUM AND ZIRCONIUM-NIOBIUM ALLOYS

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Zirconium and zirconium-niobium alloys are used on nuclear technology, as fuel cladding of nuclear reactors. Their nuclear-physical, mechanical and thermophysical properties are influenced them matrix and impurity composition, therefore determination of matrix and impurity content of these materials is a very important task

Neutron activation analysis is one from multielemental and high sensible techniques that are widely applied in analysis of high purity materials. Investigation of nuclear-physical characteristics of zirconium has shown that instrumental variant NAA is unusable for analysis due to high radioactivity of a matrix. Therefore it is necessary carrying out radiochemical separation of impurity radionuclides from matrix. Study of the literature datum have shown, that zirconium and niobium are very well extracted from muriatic solution with 5% tributyl phosphinoxide (TBPO) solution in toluene and 0,75 M solution of di-2-ethyl hexyl phosphoric acid (HDEHP) in cyclohexanone. Investigation of these elements extraction in these systems has shown that more effective and selective separation of matrix radionuclides is achieved in HDEHP-3M HCl system. This system is also extracted and hafnium, witch is an accompanying element of zirconium and its high content prevented determination of other