HYDROPONIC NEW SYSTEM FOR PRODUCTIVE USAGE OF SALINE AREAS

Hydroponics as a modern biotechnological method for plant material production is more expedient and efficient particularly in countries with limited resources of soil and water such as Armenia. Development of intensive hydroponic crop production in our republic will enable an additional ten thousand hectares of marginal lands (saline and stony soils, open mines etc.) to be brought into production.

But the creation of hydroponic systems requires initial substantial investments, thus, the development of novel and cheap systems is considered to be one of the main tasks for increasing economic efficiency of plants soilless culture.

At the Institute of Hydroponics Problems of NAS RA a new, modern system - “water stream hydroponics” with polymeric film usage for plants soilless production was worked out which is cheaper 5-6 times as compared with the existing classical hydroponicum with reinforced concrete plots.
Water stream hydroponics lays stress on the periodical and irretrievable push in the form of a jet of the nutrient solution directly to the root-bearing stratum of the plant which is regulated from the viewpoint of time and quantity. It includes the following varieties:

a) Continuous - smooth surface of land is covered with polyethylene film, which is filled continuously with some kind of substrate /gravel, volcanic slag, etc./ of 20-25cm thickness /3-20mm in pieces/. Plants are nourished with the help of the delivering polyethylene pipes /with holes on them/ which are connected with the main pipeline at a necessary distance. This variant is expedient mainly for seeded medicinal and spicy crops /motherwort, bur marigold, sage, indigo, catmint, basil, savory, etc./.

b) Cylindrical - polyethylene cylinders 30-40cm in diameter are filled with substrate-volcanic slag, gravel, etc. (3-20mm in pieces). Plant's seedlings are planted in the holes situated on the upper surface of cylinders.

c) Gully - furrows are made on the land area at a certain distance 25-30cm in depth and 35-40cm in width. The whole surface /both furrows and bushes/ is covered with polyethylene film, furrows are filled with substrate. Cylindrical and gully variants are expedient for crops' soilless production /geranium, citric sorghum, henna, aloe, kalanchoe, tobacco, etc./.

d) Perennial planting /picture 1/ - fruit-bearing or ornamental trees are planted in polyethylene pots /8/. Pots' capacity and the distance between each other depends on the crop chosen and the power of its root system. Pots are put into soil /10/. The edges of pots should be 15-20cm high from the surface of land stratum /to avoid subsoil waters/ and are filled with gravel or volcanic slag 5-25mm in diameter /9/, 4-5cm below pot's upper edge.

Crops' nourishment technology is the following: the nutrient solution passes through the cleaning filter /3/ with the help of the pump /2/ from the pool /1/ and goes to the main water-pipe /6/ which is connected with the delivering pipes /7/. Equipments for nutrient solution dosage /4/ and control /5/ are preconditioned in the net. Solution is pushed under the 0,01-0,15MPa pressure in the form of a jet (0,1-0,15kgsecond/cm²) which is spread in the root-bearing zone of the plant meeting the hard fraction of the substrate.

Duration /1/ 3 minutes, frequency /10/ 40 times a day of watering /nourishment/ as well as dosage /200-500ml/ of the nutrient solution supplied once a day are regulated depending on the cultivated tree's biological peculiarities, age, substrate, vegetation period and climatic conditions.

Equal moisture of plant's root-bearing stratum growing in a hard substrate can be ensured only if the nutrient solution is pushed under the pressure in the form of a jet which is equally spread in the whole area occupied by the root system. Moreover, nutrient solution is pushed according to the program developed beforehand without overmoistening and surplus accumulation in the pot.

So, "in water stream hydroponics" crops nourishment decreases fluctuation limits of substrate moisture and nourishment, gives an opportunity to keep simultaneous optimal presence of necessary moisture, air and nutrient elements in root-bearing stratum.

"Perennial planting water stream hydroponics" is a unique and effective way for soilless cultivation of fruit-bearing and ornamental trees. It affords an opportunity to introduce land areas useless for traditional agriculture /salines, sandy soils, etc./ into agricultural sphere.

*This method is especially efficient for rapid and considerably cheap foundation of orchards on marginal lands (for instance salines of the Ararat Valley).
Fig. 1 Scheme of "Perennial planting hydroponics"