PHYTOLOGICAL BIOCLIMATOLOGY

Section B1: General agricultural bioclimatology

SEAWATER IRRIGATION

A NEW LINE OF RESEARCH ON A BIOCLIMATIC PLANT- SOIL COMPLEX

by

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A B S T R A C T

Over a period of many years the authors have frequently observed the occurrence of non-halophytic plant species growing in islands in the midst of halophytic plant communities. Closer investigation has shown that these islands usually appear in places with high soil-permeability, or with good drainage.

In 1949, on the occasion of laying out and planting a desert-garden in Elath, on the Red Sea, this general principle was tested and used in a practical manner.

A garden was laid out and successfully irrigated with water of 2000-6000 mg/l (mainly sulphates) on completely barren slopes of broken rock debris with soil of good permeability. About 180 plant species, many of them of economic value, were introduced into this extreme desert area which has less than 25 mm average yearly rainfall. The garden is used today, as the town's recreation centre and the plants provide the basis for planting in several new settlements in the Wadi Araba.

On the basis of these results an experiment was started under extreme conditions in order to show that no accumulation takes place in the root layer in well-drained soil, even if irrigated regularly with very saline water, provided that the soil is deeper than the rootsystems of the plants grown therein. The experiments consisted of planting two species having extremely different ecological ranges on dune sand. One of the plants, *Agropyrum junceum* Beauv., is a xerophyte of shifting dunes - that is of the lightest soils. The other, *Juncus arabicus* Asch. et Buch., is a halophyte from salt swamps, and the heaviest soils. The economic value of the first lies in its high nutritive value and palatability as fodder; that of *Juncus* in its excellent qualities for papermaking (writing and printing paper).

The plants were irrigated with controlled amounts of various dilutions of East-Mediterranean seawater containing 43,600 mg/litre total salts and 31,600 mg/litre NaCl.

All soil-tests showed that even after 100 applications of seawater of the highest salt concentration (43,600 mg/litre total salt content), no accumulation occurred in the soil-layers at 10 cm, 30 cm and 60 cm depth.

These results therefore indicate that there are great possibilities for growing many plants of economic value with different ecological amplitudes, on sands and soils of similar permeability under irrigation with the large amounts of brackish waters available in deserts and, in the case of certain more salt tolerant species, with seawater. It is advocated that similar experiments should be tried out in other countries in order to coordinate and to develop their far reaching aspects.

Section C : Forest bioclimatology

Section D : Physiological phyto-bioclimatology