Quick Scan Salinity in the Metropolitan and Valparaíso Regions, Chile;

challenges and opportunities

BACKGROUND

This report, financed by the Government of the Netherlands through the Partners for Water programme, provides the results of a quick scan on the salinity and water situation in agriculture in Chile, mainly focusing on two regions: Valparaiso and Metropolitan Regions. The project was performed by The Salt Doctors (lead), Arcadis and Delphy (all based in The Netherlands) and the local office of Arcadis in Chile.

OBJECTIVE

The overall objective of the study is to enhance the climate resilience of agriculture in water scarce and saline areas in Chile, by providing insight in salinity issues and by exploring the possibilities for improving agricultural practices in a saline environment.

Impression of the visited avocado farm

APPROACH

For this, a salinity and a needs assessment were performed, by means of interviews with several stakeholders, a literature review and field visits to two farms. Based on the results, different opportunities to improve the resilience of agriculture have been formulated.

RESULTS

Salinity in Chile

In Chile, the area of salt affected land is estimated at 76 million hectares, mostly found in the North where natural fossil salt crusts and numerous saline lakes are present. In the Northern Mediterranean zone, where the two focus areas are located, around 16% of the land is reported to be salt affected (>2 dS/m). Most farmers in the focus areas rely on river water for irrigation, due to the semi-arid climate and the recent droughts. The river water itself contains salts and the highest concentrations have been observed during the last five years during periods of extreme low flow of the river. The mean salinity level of the River Maipo is 1,7 dS/m, with calcium as the main contributor to the elevated EC levels, followed by sodium.

Leaf damage by high chloride concentrations

Crops

The reported concentrations in electrical conductivity (EC) and chloride concentrations of both the river and irrigation waters at the two farms exceed the reported tolerance levels of avocado and walnut. Especially avocado is a very salt sensitive crop and it is recommended to use irrigation water with a salinity level of less than 0,6 dS/m. In this regard, the average salinity level of the Maipo River exceeds the tolerance level of avocado and salt damage, in the form of leaf burn caused by chloride, has been observed at the visited avocado farm. Different cultivars or rootstocks of avocado differ in salt tolerance, with the West Indian rootstocks showing the highest level of salt tolerance.

NL Países Bajos
GLOBAL IMPACT PARTNERS FOR WATER PARTNERS FOR WATER
The Salt Doctors
Reino de los Países Bajos

Overview of the water and soil analysis of the two farms that were visited.

Source	Location	pH	EC	Chloride	Sodium	Calcium	Magnesium	Potassium	Boron
			in dS/m	*in mg/L*	*in mg/L*	*in mg/L*	*in mg/L*	*in mg/L*	*in mg/L*
Water	Walnut farm	7,8	1,2	158	86	140	13	4,5	0,16
Water	Avocado farm	7,8	1,7	236	119	187	38	9,2	0,19
			in mg/kg	*in mg/kg*	*in mg/kg*	*in mg/kg*	*in mg/kg*	*in mg/kg*	*in mg/kg*
Soil	Walnut farm	8,3	1,2	109	567	20515	8330	1928	<25
Soil	Avocado farm	6,1	1,3	86	87	2741	2634	875	<25

Needs and recommendations

Salinity is a complex issue, affecting not only crop growth, but also soil conditions can be affected and integrated water management is needed. Often tailor-made solutions are needed, for which proper data collection and analysis are essential. Several needs and recommendations have been highlighted that are linked to:

- Data collection, mapping and monitoring at farm and regional level;
- Tailor-made training and capacity building on methods to deal with salinity;
- Water and irrigation management at farm level;
- Water management and governance at regional level.

Impression of the visited walnut farm

Opportunities

Several opportunities are highlighted in the report, linked to crop, soil, and water management at field level as well as at regional level. Several opportunities that can help to improve crop yield at farm level include:

- Using West Indian rootstocks for avocado, which are more salt tolerant;
- Improve soil conditions by adding organic inputs and use fertilizers that are free of sodium chloride and often also magnesium should not be applied;
- Ensure soil pH is in the proper range and the use of foliar fertilizer may be needed to ensure good nutrient balance within the crop;
- The use of (organic) mulch and cover crops can reduce evaporation and improve water infiltration;
- Ensure proper drainage and leaching of excess salts may be needed frequently;
- On-farm water reservoirs can collect river water in times of low salinity and act as rainwater storage, to ensure using low salinity irrigation water;
- Precision irrigation, by means of a weather station or soil moisture sensors, can ensure the optimal water balance in the soil.

Países Bajos
GLOBAL IMPACT PARTNERS FOR WATER
The Salt Doctors
Reino de los Países Bajos