

How do they do it?

Growing peppers under saline conditions in the Negev Desert

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Udi Bar, bell pepper grower,
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Paran is a small moshav located in the Arava desert in southern Israel with a population of around 500. Each family farm unit covers 5 ha. The main crops are high quality peppers and flowers for export. In addition, 14 families run a cowshed of 40-45 dairy cows each.

Among the smaller farm branches are a date palm orchard and turkey production.

Most of the surface of the southern Negev has a stony and sterile cover. The average annual rainfall is below 50 mm. A boring located close to a geologic

fault provides water from a considerable depth, close to 1600 m. This is fossil water originating in the Nubian Sandstone formation. It is, therefore, a non-renewable resource, but at present rates of utilization the supply should last for at least 200 years*. Salinity in this water results mainly from calcium sulfate and reaches an EC of 2.8 dS/m.

**From: Arid Zone Agriculture in the Arava in Israel: Unconventional Agroclimatic Resources and Risks*

To understand how farmers manage to grow high quality crops in these difficult conditions we talked to Udi Bar, a bell pepper grower, born and raised in Paran. Udi is a veteran grower, very professional and one of the largest growers in the area with 10 ha of pepper greenhouses.



Udi, tell us about your pepper farm



We're having a good season, good weather. In the first harvest this season the fruit was a bit small, perhaps because of the August heat waves. I'm not worried about growing the crop, but about marketing and sales. We depend on export as the local market is too small, mostly to Russia. But there's a big reduction in export: in 2014 Israel exported 70,000 tons, and now less than 50,000 tons: the sanctions on Russia affect us as well as growers in Turkey and Morocco. We plant the peppers in July and harvest in several waves between November and April or the beginning of May latest. We use cultivars which are not especially salinity tolerant but were developed in the country and grow well in the local conditions.

We Paran farmers specialize in growing high quality peppers for export. We grow them directly in the soil, but as the local loess soil is impenetrable and stony and saline, it's covered with a 40-50 cm layer of sand we brought in from elsewhere. The sand has the additional advantage of having no indigenous salinity. Each season, before planting we flush the soil with 1000-1500m³/ha to begin with a less saline soil.

Water quality is low. Other than salinity, it has sulfur and bacteria. The quality has reduced with time, as pumping raises salinity and as higher salinity water from new boreholes is added to the reservoir. Due to the high salinity, there are crops that it is no longer possible to grow in Paran, such as grapes. The plants degenerate and the vineyard must be uprooted after only 5-8 years.

With higher water quality we could get much better results. We use 1.5 X the amount of water we would need with better water, just to flush the salts to below the root zone. Even so, the plant manages to uptake less water and nutrients and this is a disadvantage in the competitive market. The dairy farm began desalinating their water, resulting in a significant increase in productivity.

Fertilizer is applied according to plant requirements and no more. In the beginning of the season, when very little water is applied, we are wary of salinization. Tap water including fertilizer can get to an EC of 3.5 dS/m. We use a soil solution extractor and test the EC and nutrients in the soil, which can get to 7-8 dS/m in the root zone. Every few days we halt the fertilization and flush the soil.



Drip equipment lasts for years as a result of good maintenance. Of course, salts damage the equipment. There's a lot of scale deposit, and bacteria and salts clog the drippers. Regular acid treatments aren't always enough, we also do maintenance with hydrogen peroxide and still suffer a lot of damage to the equipment.

We do maintenance treatments every season. At the end of the season we apply sulfuric acid and a couple of months later we apply hydrochloric acid.

Thin wall equipment such as Super Typhoon™ lasts only two years in Paran. We used to use it for three years but the damage to the crop was too big. Uniram™ is very successful and lasts up to 7-8 years with high pressure and strict maintenance.

Each farm in Paran has its own water storage tank. So water is pumped when available and irrigation is applied when the crop needs it, in the morning.

Yield is high in Paran, at 120 tons/ha, while in the rest of the Arava desert it's normally around 70-80 tons/ha. The result of high professionalism of the farmers, agricultural R&D and cultivar development is maximal yields under the present conditions. We only need better water!