

## **Application of water saving technologies in irrigation: Southern Kazakhstan case study**

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Ever-increasing deficit of water resources in the world encourages shifting to water-saving technologies in all water using spheres. Substantial water saving can be reached in the irrigated agriculture because it consumes more than 70% of the total used water.

There are 525 thousand hectares of irrigated land in the Southern Kazakhstan. According to forecasts, by 2030 the irrigated area will fall down to 474 thousand hectares due to reduction of irrigation capacity of water sources if existing irrigation technology is kept [1].

Today in the Southern Kazakhstan like across the whole Central Asia, the most widespread water application technique is furrow irrigation. But under this technology the high efficiency of water use and good uniformity of watering along the furrow can be reached by means of discrete and variable inflow into the furrow, furrow mulching, and applying various fittings for stream regulation. Nevertheless, using this technology, we, first of all, irrigate furrow, rather than plants.

Under drip irrigation, the plants are irrigated constantly with small rate and if needed the fertilizers are being injected into irrigation water too.

Adoption of drip irrigation systems in the Southern Kazakhstan for last two decades can be divided into two stages: the first - from 1992 till 1996; and the second - from 2004 till the present time.

In the first period, when drip irrigation systems were applied "from the top", without training of local personnel, with violation of agronomic technologies, crop yields under drip irrigation were mainly the same as under furrow irrigation, with the exception of tomatoes in collective farm "Victory" in the Sairam district, where tomato yields amounted 800 kg/ha. In 1993, the total area of drip irrigation in the region reached 1,872 hectares, and at the same time mainly cotton was irrigated - 1590 ha. After breaking up of the collective and state farms in 1995-1996, private land users were not able to continue to operate these systems, and they were neglected and deteriorated. [2].

The second phase of the drip irrigation in the Southern Kazakhstan Region began in 2004, when a joint Israeli-Kazakh venture "PRINIR -2004 RK" was established for the production of tomato paste on the base of Belovodskiy processing plant in the Sairam district.

New stage of drip irrigation in the Southern Kazakhstan was started in other socio-economic conditions developing at this time in the countryside. Tens of thousands of newly created, on the base of previous collective and state farms, low-power small farms, not having sufficient financial resources, were not able to develop commercial agricultural production even using the old technologies of production, not to mention the use of modern irrigation systems, purchasing and processing of products. Essential financial investment was needed for this purpose. That was the first activity the LLC "PRINIR -2004 RK" began to deal with.

Firstly, the inactive fruit-processing plant was equipped additionally and reconstructed for processing the tomato paste.

Secondly, the Israeli drip irrigation systems and the whole set of necessary agricultural machinery and equipment for irrigation of tomatoes on an area of 150 hectares were brought. Throughout the vegetation period the qualified experts from Israel led the process of tomato cultivation. From many leading foreign companies the high quality seed varieties of tomato

were bought, the strictly metered fertilizers, and herbicides and plant protection materials were used. And the result was not long in coming. For three years (2005-2007) annually 80-100 tons per hectare of tomatoes were harvested on the thin (10-15 cm) stony soils in the former rural airfield near the Karamurt village in the Sairam district on the area of 150 ha. The harvest straight from the field was daily transported to the processing plant for production of tomato paste. Up to 500 tons of tomatoes were processed daily. The products (tomato paste) were prepared for long-term storage and sale on the markets of CIS countries and abroad.

A number of another companies and farms followed the LLP PRINIR-2004 RK and started to cultivate orchards, vineyards, vegetables and melons, sugar beets and cotton using drip irrigation technology. The total area of drip irrigation in the region at the end of 2010 reached more than 7.0 hectares and it is planned to increase it to 51.0 ha by 2015.

Thus, the beginning of the second phase of the drip irrigation system, with strict observance of agro-technology of tomato cultivation, in conjunction with the harvesting and processing of raw materials to finished product sales showed that even on the land which is completely unsuitable for cultivation of crop by traditional methods the high yields of tomato is possible to obtain under drip irrigation, while using water and land resources more efficiently than under traditional production technology.

#### References

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