



## **Economic analysis of the advantages of Tal-Ya technology**

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Several years of experience in utilizing Tal-Ya devices, in the open field and in the extension station, proved that it is a breakthrough in agricultural technology.

The economic advantages of Tal-Ya technology at the farmer's level are materialized mainly by means of decreasing expenditures and increasing profitability. Yet, there are also advantages at the national level, by means of savings of national resources, by contribution to the environment quality and by prevention of soil contamination.

Most of the advantages at the farmer's level can be quantified, namely: the savings of water, pesticides, fertilizers and human labor. It is more complex to quantify other advantages like earlier maturation, better quality or prevention of damages caused by frost. Due to lack of experience and information, there is no direct way to quantify the advantages at the public level. However, it is clear that this new technology will significantly affect the agriculture and water management at the national level. It is also envisaged that the contribution of Tal-Ya technology will enable the use of marginal land and marginal water which are not deployed today.

### **The advantages at the farmer's level**

The advantages of applying Tal-Ya devices at the single farmer's level derives from savings in usage of water, fertilizers, herbicides and human labor, as well as increase in quantity and quality of the agricultural product. These advantages affect the level of income and of expenditures in each crop and in each season in a different way. The cost of Tal-Ya devices and their application in the field should be deducted from the benefit, but the use of the devices is multi-seasonal, thus, a single season bear only a proportional part of the application cost. In the economic analysis it should also be considered that after several seasons the devices can be recycled.

#### Water saving

The covered area around the plant by Tal-Ya devices enables a significant reduction of water amounts given to the plant. This is due to the decrease of evaporation, to keeping the soil constantly wet and to the prevention of weed growth. Such effect is achieved, apparently, also by polyethylene sheets, but Tal-Ya devices preserve the ground more ventilated and are more efficient in exploitation of dew and drip and sprinkling irrigation. All these advantages are more significant in mid-summer, but it might save the need of auxiliary irrigation in the spring and autumn. The special geometry of Tal-Ya devices enables the plant to enjoy even small quantities of rain.

Field experiments in vegetables that took place in "Lachish" extension station and in a private field at "Gan Yoshiah" proved savings of about 50% in water consumption as compared to control slots, without any reduction in quality and quantity of the product.

#### Fertilizers saving

Field experiments in fertilizing through the irrigation system proved that the amount of fertilizers can be reduced at the same rate as water reduction with Tal-Ya devices. The enable the fertilizer to concentrate in the root zone and



less amount is washed down into the deep ground. A better, quantified assessment of the savings must be based on specific experiments, including soil analyses, in order to optimal fertilizing recommendations.

#### Pesticides saving

Tal-Ya devices prevent a contact between the plant's stem and leaves and the soil. Thus it lowers the chance of pests to develop and lowers the need of pesticides. It is premature to quantify the cost savings.

#### Saving of herbicides and hired labor

This kind of saving is due to the opaque cover that prevents weeds to develop. This effect is expected also with polyethylene sheets, but it is less significant. Field experiments proved the decrease of labor for weeding.

#### Quantity and quality of product

Various field experiments pointed out that using Tal-Ya devices increased the quantity and quality of fruit and vegetables. Some experimental plots yielded larger, high quality vegetables as compared with the control plots even with lower amounts of water and fertilizer. In other experimental plots the use of Tal-Ya devices increased the uniformity of the crop, which has an economic advantage. The reason for these observations is, probably, a better exploitation of water and fertilizers and a better aeration under the devices. Another assumed factor is the lower difference between day and night temperatures in the root zone under the devices. It is assumed that this will have a higher effect in winter, autumn and spring crops.

Field experiments in vegetables grown by farmers at "Gan Yoshiah" proved increase of about 12% in yield and more conformity of product as compared to the control plots.

#### Earlier maturation

Earlier maturation has been observed in some experimental plots, but there are no quantified records. Additional experiments are needed to prove and quantify this phenomenon.

#### Combined effect in greenhouses and nurseries

Based on the results in the open fields, it can be assumed that Tal-Ya devices will have a combined effect on water and fertilizers consumption and on the quality and quantity of the product in greenhouses and nurseries. The economic result in such areas is higher due to the higher value of product per given area.

#### Tal-Ya technology in plantations

Tal-Ya devices for trees has been implemented mainly in olives and lemons. Farmers reported faster development of young trees in Tal-Ya plot as compared to control plots, in spite of smaller amounts of water.

#### Optimization of dozes

Optimal results of Tal-Ya technology will be achieved by optimal dozes of water, fertilizers, pesticides and herbicides. The set of recommended dozes for various cops, regions and seasons for conventional agriculture has been developed by the Israeli Ministry of Agriculture throughout tens of years of field experiments made by farmers and the National Extension Service. Thus, it is expected that developing a set of recommendations for optimal use of Tal-Ya technology will deserve a series of field experiments devoted for that purpose.



### Farmer's profitability

The average seasonal savings achieved in a series of experiments in vegetables growing in Lackish and in Gan Yoshiah spanned between NIS 2,500 and NIS 4,600 per dunam. The basic investment in purchasing and applying the existing vegetable Tal-Ta devices is about NIS 4,000 per dunam. It means that the basic investment is returned within one or two seasons.

The existing model of Tal-Ya devices can be reused for 10 seasons. It means that the net savings per season is about NIS 2,100 – 4,200 per dunam. Such saving is about 10 – 20% of the total expected seasonal revenue.

The a.m. calculation neglected the better quality of product and other advantages mentioned in this paper.

In lieu of the on-going deterioration of profitability of agriculture in Israel, it is clear that Tal-Ya technology is a promising tool with the potential to increase or at least preserve profitability.

### **Advantages in the national level**

The main factor affected by Tal-Ya technology is water. Fast dissemination of the technology to the Israeli agriculture will have a vast effect on the demand for water in the national level.

Israeli agriculture leads the world's innovation and efficiency in irrigation. During the last 40 years the agricultural product has been multiplied by a factor of 5, while water consumption remained constantly at the same volume (See: tables 9, 19.13 and 19.14, the Israel Central Statistics Bureau annual). This vast increase in efficiency is a result of the development of new methods in agro-technology, selection of new species and varieties and development of innovative irrigation methods. The main breakthrough in irrigation was the introduction of drip irrigation which has been spread all over the world. Tal-ya technology has the characteristics of a breakthrough.

Careful calculation estimates that about 3.5% of the total agricultural national water consumption can be saved by implementing Tal-Ya technology within several years.

The possibility to such saving in water consumption justify national support to further develop and disseminate Tal-Ya technology, especially in lieu of the current national water shortage.

Replacement of polyethylene sheets by Tal-Ya devices will contribute to the environment by diminishing the polyethylene sheet remains. The Tal-Ya devices can be used several times, several seasons and then be recycled.

Lowering fertilizers dosages due to Tal-Ya technology will decrease the contamination of ground-water by fertilizer residues.

### **Engineering and agro-technical considerations**

#### Adaptation of the devices for various uses

Further development of the technology will aim for different and specific configuration of the devices for specific crops: Larger devices for plantations, devices for forestry, various geometries for different sizes of crops etc.

#### Mechanization



Manpower is a significant factor in the initial investment of implementing Tal-Ya. Mechanization of the primary spreading out of the devices is essential where man power is rather expensive.

#### Adaptation of irrigation devices

Additional economic potential hides in the development of drip irrigation and sprinkling devices, specially adapted for Tal-Ya technology.

#### **Further research and development**

Development, penetration and dissemination of new agricultural technologies took a very long time in the past. That is because experiment rounds in the field last, at least, one season. In plantations it takes several years. Most know-how is gathered by private farmers and a lot of effort is needed to collect and analyze the collective experience.

Enhancing the development and marketing of Tal-Ya technology will need further investigations and experiments. A long range development and marketing program is needed to be worked out.

There is not enough understanding of all the biological phenomena and processes that take part in the activity of Tal-Ya devices. A better understanding, a result of further research, will contribute to achieve better field results.