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"Tal-Ya Trays "

Enhancement of Pine trees reforestation

A summary by Prof. U Kafkafi
Based on field experimental data (in Hebrew) Collected by
Dr. Nir Her, Agronomist JNF

On a hilly slope located in the lower Galil area, near Nazareth, Israel, covered with limestone gravel on a barren soil (containing about 60% montmorillonite clay) slope, an experimental plot of three groups of tree covers treatments was initiated in 2010.

The treatments were:

- 1) 66 - trees as a control group , (no soil cover -barren),
- 2) 9- small size (0.55*0.72) tray ,
- 3) 9 - big size 91.05*1.22) tray.

Dr. Her's Summary concluded 2 years of natural growth after planting:

Interim conclusions:

- 1 - Trees height was clearly affected by Tal - Ya tray in the following sequence :
Tal-ya Big soil cover >> Tal-Ya Small soil cover > bare soil
- 2 - The trunk diameter of trees grown with the big and small Tal-Ya covers is significantly larger than barren planted trees.
- 3 – A consistent increase in height and stem diameter is observed in the trees in the big size Tal-Ya soil cover.

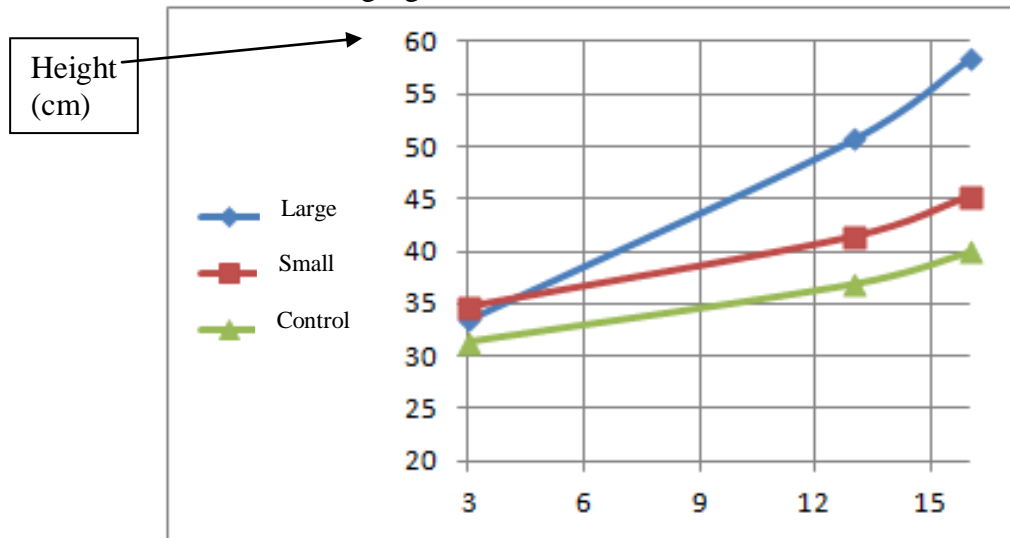
Additional comments must be reported though they cannot be fit in the statistical analysis:

- 1- Of the 66 trees originally planted without Tal-Ya soil cover (TSC) 24 trees (36%) died in the first year after planting due to lack of water in the barren soil.
- 2- The slope and the shallow soil lying on the bedrock allowed soil erosion. Under Tal-Ya cover the soil was kept moist and no soil around the tree was washed away. In several cases washed soil from upper soil areas has accumulated on the border of the Tal-Ya cover facing the upper slope.



Slope area. Soil erosion is eminent

The results of 18 months of observations in "Ixsal forest" (near Nazareth) October 2011 are summarized in the following figure:



Green line – control
 Red line - small soil cover
 Blue line – large soil cover

Forestation practice leaves the planted seedlings to sustain the elements and no man care is taken for their survival. The use of the soil cover helped the young seedling to fight the elements. Not even one plant of the trees with cover died during the 2 years following the plantation as compared to 32 seedlings that died when no Tal-Ya trays were used.

Statistical analysis

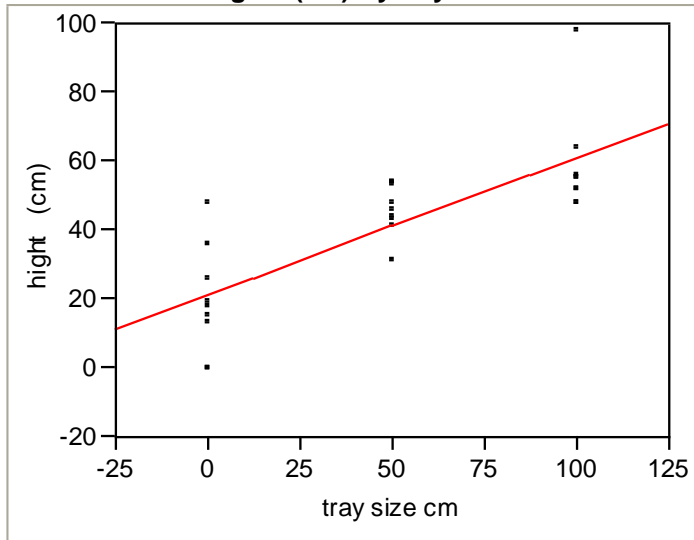
The ratio between plant height and tray size (Tal Ya cover) is shown in figure 2. At treatment - **0 tray size**, the height variability ranges from 0 (a dead plant) to 50 cm with the average height of less that 20 cm. A more uniform height of trees is observed in the **50 cm small tray size**. A one single plant with 100 cm height was found under the **big cover**. The regression line in Figure 2 suggests that every increase in one cm of soil cover increases tree height by 0.39 cm.



Large Tal-Ya soil cover, 16 months after planting. The tree is perfectly developed and the Tal-Ya soil cover is now ready for re-use.

Fig 2

Bivariate Fit of hight (cm) By tray size cm



Linear Fit for figure 2.

$$\text{hight (cm)} = 21.759259 + 0.39 \text{ tray size cm}$$

Analysis of Variance

F Ratio	Mean Square	Sum of Squares	DF	Source
37.5291	6922.72	6922.722	1	Model
Prob > F <.0001	184.46	4611.574	25	Error
		11534.296	26	C. Total

Parameter Estimates

Prob> t	t Ratio	Std Error	Estimate	Term
<.0001	5.27	4.132784	21.759259	Intercept
<.0001	6.13	0.064025	0.3922222	tray size cm

This statistical analysis proves the benefit of Tal Ya Trays for tree establishment in very harsh soil and climate conditions,

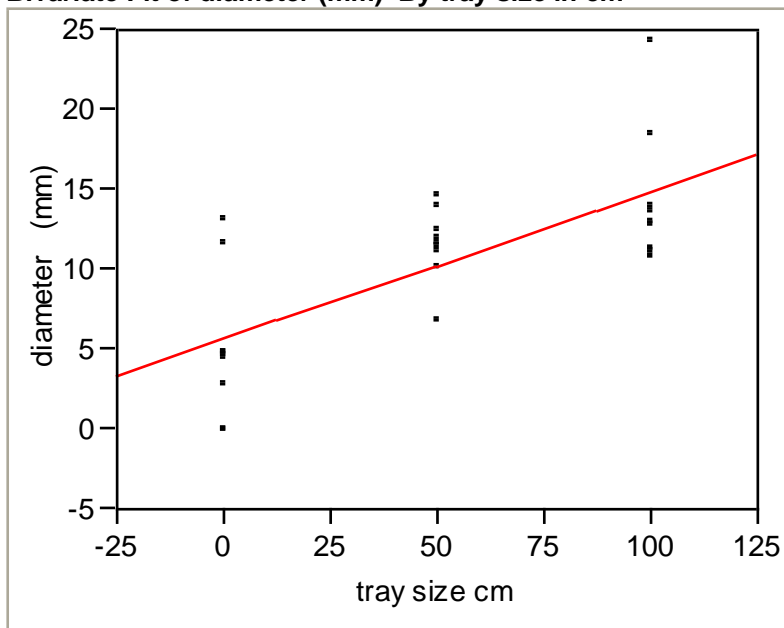


A small Tal-Ya soil cover 16 month after planting. After tree establishment the Tal-Ya soil cover is ready for use in new planting

The statistical analysis of trunk diameter gives a similar trend to that of tree height. The linear fit of the data suggest that trunk increase in diameter increased by 9 mm for a tray of 100 cm.

The variability between individual trees was largest in the no cover treatment since two plants in the zero cover treatment did not survive and withered.

Fig 3
Bivariate Fit of diameter (mm) By tray size in cm



— Linear Fit

Linear Fit

$$\text{Diameter (mm)} = 5.7292593 + 0.0920222 \text{ tray size (cm)}$$

Analysis of Variance

	F Ratio	Mean Square	Sum of Squares	DF	Source
	25.1350	381.064	381.06402	1	Model
	Prob > F	15.161	379.01727	25	Error
	<.0001		760.08130	26	C. Total

The trunk diameter is also clearly benefited from Tal-Ya soil cover, In the extreme case the tree diameter was 5 times thicker than the average diameter without soil cover The mean trunk diameter was 3 times larger than that of the barren trees at the same period of growth.

Economic evaluation:

With no Tal-Ya cover, 36% of the planted trees died during the period two years after planting.

The fact that all planted trees under cover survived while about 1/3 of the uncovered plants died, calls for finance loss estimation as compared to the Tal Ya trays performance taking into considerations to total cost of labor and time saved of the growing forest.

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