The Israeli Avocado breeding program – past, present and future

Israel avocado cultivars

- 'Hass' 35%
- 'Fuerte' 25%
- 'Reed' 10%
- 'Nabal' 25%
- Others

Avocado plantations 2011 65,000 Dunams
Average yield increasing:

2000 and later: average yield has been stabilized around 14 ton/ha.


2011 +/- 65,000 Dunams
Avocado Breeding project objectives:

1-Select new avocado cultivars superior to 'Hass' in productivity, fruit size, performance and stress tolerance ('Hass-like' cultivars).

2-Select early and late season, green skin new cultivars.

Products released from the breeding program:

'Iriet' (Lahav et al., 1989)
'Galil' (Regev et al., 1998)
'Arad' (Lahav et al., 2005)
'Lavi' (Regev et al., 2005)
'Bar' (Regev et al., 2011)
'Moti' (Regev et al., 2011)
'Naor' (Regev et al., 2011)
‘Hass’-like cultivars

‘Lavi’
- Found to be especially interesting for being ‘Hass’ like in its form with a larger fruit.
- Productivity of ‘Lavi’ is good 20t/ha.
- Smaller tendency toward alternate bearing than ‘Hass’.
- The seed is small (6-12% of final fruit weight).
- Buttery texture and good taste.
- Harvest season Jan- Mar.

‘Naor’
- ‘Hass’ like in its form but with larger fruit. (335 g).
- Excels in early productivity, high production and low tendency for alternate bearing.
- Peel separation of the ripe fruit is very good.
- The stone is small (13-17% of the fruit weight).
- The flesh is yellow-green, good nut-like taste.
- Harvest season from Dec to Mar mainly Jan-Feb.
Green- skin new cultivar

Good producer and has low tendency for alternate bearing.

Fruit color is light green and weight averaging 280g.

The mature fruit remains green till ripening.

The thin, leathery peel separation from the flesh is difficult.

The flesh is light-yellow with a narrow green rim, buttery texture.

'Galil' is not aimed for export but for immediate consumption in the local market.

'Galil' is the earliest maturing summer cultivar, harvested from Aug to Sep.

(Before 'Ettinger', a season of great demand for avocado in Israel).
'Moti' excels in productivity but tends to alternate bearing.

Fruit is relatively large, weighting between (averaging 380 g).

The peel is smooth, glossy, relatively thick.

The flesh is yellow with green stripe at the margins, has buttery texture.

Harvest season is late - from January to April.
Harvesting season

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Renewed Avocado breeding program (2008...)

Stages in the current project

A- Seed collection:

1- From interesting cultivars 'mother -trees' (open pollination).

2- From caged trees (self/cross pollination)

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<tr>
<th>% Selected types</th>
<th>23,049</th>
<th>Seedlings</th>
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<td>10</td>
<td>Cultivars</td>
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Data analysis from previous breeding program

Akko station April 2010
B- Seed germination and grafting.

C- Transfer to 'Seedling -plots', examination after first fruit appearance.

Fruit characteristics - color, size, seed size, postharvest quality yield, flowering, stress tolerance

E- Transfer of the selected types (0.5% out 20,000 ) to 'Examination plots' Performance tracking.

So far .. 7,230 seedlings
Integration of classical breeding and advanced genomic technologies - Avocado project

Genetic variation (mainly SNPs)

High throughput sequencing

Bioinformatics

In collaboration with: Amir Sherman Ron Ophir
Integration of classical breeding and advanced genomic technologies - Trait mapping using germplasm

Self design SNP array

Phenotypic variation germplasm/populations

AGILENT services
15,000-20,000 SNPs

In collaboration with:
Amir Sherman
Ron Ophir

Mapping Agricultural important traits
Integration of classical breeding and advance genomic technologies - Avocado project

Genetic engineering like transformation or siRNA etc, if the genes and the biological process is known

Basic research studies:
Molecular mechanisms controlling avocado 'Hass' fruit size - Implications for Crop Yield Enhancement.

SF   NF
105 DAFB
(Days after full bloom)
Breeding of new avocado cultivars

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Micky Noy  Extension service, Israel, Ministry of Agriculture
Adolfo Levin  Acco Regional Experiment. Station, Israel
Edna Pesis  Volcani Center ARO
Oleg Finberg  Volcani Center ARO

Bioinformatics
Amir Sherman  Volcani Center ARO
Ron Ophir  Volcani Center ARO

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SNPs information can be also used for progeny genotyping

In collaboration with: Doron Schinder
שנים אבוקדו חדשים (تاريخ תצוגה והשמעת שמות השלד 것ארכיה ללא כתיבת כ地區 חליפות)