The impact of Caucasus honeybee research of ANG Foundation to Turkish Beekeeping

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What are you going to listen?

• Honeybee subspecies in the world
• Honeybee subspecies in Turkey
• Beekeeping in Turkey
• What ANG foundation added to Turkish beekeeping
  - Selection and Breeding
  - Conservation
  - Rural development
  - Scientific
  - Tourism
Honeybees of the World
Apis mellifera L. “western” honey bee

- Distribution is naturally allopatric to the rest of the genus Apis

- Africa, Europe and Central and Western Asia

- 26 recognized subspecies

+ Apis mellifera simensis
Honey bees are distributed all over the world.
Honey bee subspecies in Europe and Asia
Honey bee subspecies of the World

- *Apis mellifera carnica*
- *Apis mellifera ligustica*
- *Apis mellifera cecropia*
- *Apis mellifera adami*
- *Apis mellifera mellifera*
- *Apis mellifera caucasica*
- *Apis mellifera iberica*
- *Apis mellifera scutellata*
- *Apis mellifera lamarckii*
- *Apis mellifera litoreana*
- *Apis mellifera anatoliaca*
- *Apis mellifera syriaca*
- *Apis mellifera pomeronella*

+ *Apis mellifera cypria*
+ *Apis mellifera meda*
+ *Apis mellifera monticola*
+ *Apis mellifera yemenitica*
+ *Apis mellifera adansonii*
+ *Apis mellifera capensis*
+ *Apis mellifera unicolor*
+ *Apis mellifera sahariensis*
+ *Apis mellifera sicula*
+ *Apis mellifera intermissa*
+ *Apis mellifera iran*
+ *Apis mellifera ruttneri*
+ *Apis mellifera armeniaca*

+ *Apis mellifera simensis*
Distribution of *Apis mellifera* L. subspecies in Turkey and the Near East.
Beekeeping in Turkey

- 5 million honeybee colonies present in Turkey
- Average 17 kg honey production / colony
- Honey production is about 71,000 tons, 4th in the world following China, U.S.A, and Argentina.
- Thousands of families make their living from beekeeping in Turkey
Gradual progress in Turkish beekeeping  
(Bodenheimer, 1939 and FAO)

<table>
<thead>
<tr>
<th>Years</th>
<th>Primitive Hives</th>
<th>Modern Hives</th>
<th>Total Honey Production</th>
<th>Modern Hives (%)</th>
<th>Honey Production (kg/colony)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1933</td>
<td>931,331</td>
<td>15,468</td>
<td>946,799</td>
<td>1.6</td>
<td>4.44</td>
</tr>
<tr>
<td>1937</td>
<td>1,088,523</td>
<td>45,071</td>
<td>1,133,596</td>
<td>3.9</td>
<td>4.57</td>
</tr>
<tr>
<td>1960</td>
<td>1,302,000</td>
<td>195,400</td>
<td>1,497,400</td>
<td>13.05</td>
<td>6.51</td>
</tr>
<tr>
<td>1965</td>
<td>1,320,969</td>
<td>299,456</td>
<td>1,620,456</td>
<td>18.48</td>
<td>6.37</td>
</tr>
<tr>
<td>1970</td>
<td>1,253,568</td>
<td>567,394</td>
<td>1,820,962</td>
<td>31.16</td>
<td>8.18</td>
</tr>
<tr>
<td>1975</td>
<td>1,054,656</td>
<td>918,628</td>
<td>1,973,284</td>
<td>46.55</td>
<td>10.77</td>
</tr>
<tr>
<td>1980</td>
<td>893,260</td>
<td>1,332,217</td>
<td>2,225,477</td>
<td>59.86</td>
<td>11.30</td>
</tr>
<tr>
<td>1985</td>
<td>645,142</td>
<td>1,940,161</td>
<td>2,585,303</td>
<td>75.05</td>
<td>13.86</td>
</tr>
<tr>
<td>1990</td>
<td>293,948</td>
<td>2,989,510</td>
<td>3,284,000</td>
<td>91.05</td>
<td>15.61</td>
</tr>
<tr>
<td>1995</td>
<td>214,594</td>
<td>3,701,444</td>
<td>3,916,038</td>
<td>94.52</td>
<td>17.52</td>
</tr>
<tr>
<td>1996</td>
<td>217,140</td>
<td>3,747,578</td>
<td>3,964,718</td>
<td>94.53</td>
<td>15.88</td>
</tr>
<tr>
<td>1997</td>
<td>204,103</td>
<td>3,798,200</td>
<td>4,002,303</td>
<td>94.90</td>
<td>15.82</td>
</tr>
</tbody>
</table>
Honey bee statistics about world beekeeping industry (FAO, 2013)

<table>
<thead>
<tr>
<th>Country</th>
<th># of colony</th>
<th>kg/coll</th>
<th>Country</th>
<th>Honey production (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 China</td>
<td>6,900,000</td>
<td>37.08</td>
<td>1 China</td>
<td>255,839</td>
</tr>
<tr>
<td>2 Turkey</td>
<td>5,200,000</td>
<td>16.14</td>
<td>2 Argentina</td>
<td>98,000</td>
</tr>
<tr>
<td>3 Russia</td>
<td>3,600,000</td>
<td>13.89</td>
<td>3 USA</td>
<td>94,000</td>
</tr>
<tr>
<td>4 Ethiopia</td>
<td>3,400,000</td>
<td>8.52</td>
<td>4 Turkey</td>
<td>74,000</td>
</tr>
<tr>
<td>5 Iran, Rep.</td>
<td>3,300,000</td>
<td>7.42</td>
<td>5 Mexico</td>
<td>58,000</td>
</tr>
<tr>
<td>6 USA</td>
<td>2,688,000</td>
<td>35.00</td>
<td>6 Russian</td>
<td>50,000</td>
</tr>
<tr>
<td>7 Tanzania</td>
<td>2,600,000</td>
<td>10.00</td>
<td>7 Spain</td>
<td>32,000</td>
</tr>
<tr>
<td>8 Kenya</td>
<td>2,490,000</td>
<td>8.48</td>
<td>8 Ethiopia</td>
<td>29,000</td>
</tr>
<tr>
<td>9 Argentina</td>
<td>2,300,000</td>
<td>42.60</td>
<td>9 Tanzania</td>
<td>26,000</td>
</tr>
<tr>
<td>10 Mexico</td>
<td>2,100,000</td>
<td>27.61</td>
<td>10 Kenya</td>
<td>24,940</td>
</tr>
</tbody>
</table>
Genetic structure in Turkey

- Five different subspecies. The richest country in terms of honey bee biological diversity.
- Several research projects showed that isolated honeybee populations are still keeping their own genetic makeup.
- More researches are still underway in order to determine and conserve this genetic biodiversity.
Migratory beekeeping in Turkey:
• Widespread experience for the last 50 years
• More than 75% of the colonies were involved
• At least 1, sometimes 5-6 times migration in a year
• Increasing hybridization or admixture and losing original genetic pool

Queen production in Turkey:
• 200,000 queen production in a year
• At least 1 million required in a year

Low honey production:
• 17 kg / colony
• Reverse proportion between floral diversity and honey production
• Low quality queen bees
Floral diversity in Turkey

10,000 plant species
3,500 endemic
Br. Adam
1898-1996

• Visited Turkey three times in 1954, 1962, 1972 for beekeeping observations.

In Buckfast line, Adam used Anatolian race as one of the parental type. Buckfast is still in use...
What ANG foundation added to Turkish beekeeping

- Selection and Breeding
- Conservation
- Rural development
- Scientific
- Tourism
Geographic isolation of Caucasus bees in Camili valley:
- Surrounded with high mountains (27,000 ha)
- Located 50 km (Inland) from Black Sea, the highest point is 3415 m
- The altitude of the valley is 400 m and flowering season starts from March and continues all summer. This region is diverse in terms of nectarous plants such as Rhododendron, chestnut, linden, clover, blackberry.

Traditional beekeeping in the Valley:
- 2400 colonies were counted in 1998
- Beekeeping in Trees, 50% of them are primitive log hives
- Honey production is 25-30 kg/colony; but in some colonies it reaches to 80-100 kg.

Conserving the Valley:
- Geographically inaccessible during most of the year
- The closest colonies from Georgia is 30 km away
- Other supports for conservation come from TEMA, Ministry of Agriculture, Ministry of Environment and Forestry, Military
Artificial Insemination Studies:

• Laboratory was established in 2001

• Reared queens were artificially inseminated with drones collected from the colonies having high honey yield

• Queen quality was controlled and queens less than 215 mg were not marketed

• Parental and maternal lines were recorded in order to control and prevent inbreeding
Selection studies for high honey yield using Apis mellifera caucasica
Queen bee production by the local people in Macahel

<table>
<thead>
<tr>
<th>Year</th>
<th># Queen</th>
<th>Value ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>2000</td>
<td>28,000</td>
</tr>
<tr>
<td>2000</td>
<td>3000</td>
<td>42,000</td>
</tr>
<tr>
<td>2001</td>
<td>4000</td>
<td>56,000</td>
</tr>
<tr>
<td>2002</td>
<td>4500</td>
<td>63,000</td>
</tr>
<tr>
<td>2003</td>
<td>6000</td>
<td>84,000</td>
</tr>
<tr>
<td>2004</td>
<td>7000</td>
<td>98,000</td>
</tr>
<tr>
<td>2005</td>
<td>17,000</td>
<td>238,000</td>
</tr>
<tr>
<td>2006</td>
<td>25,000</td>
<td>350,000</td>
</tr>
</tbody>
</table>

- 33 families are involved in queen bee production in 2006
- Total income reached to $350,000

- # families involved in this project increased from a few to 33
- Family income increased from $1,000 to $10,000

- In 2005, grants from European Union a total of 130,000 Euros
- 60 unemployed young were educated for beekeeping and queen bee production.
- 40 beekeepers were educated and switched organic honey production.
Scientific Studies

- **Morphometrics**
- **Protein electrophoresis**
- **mtDNA-RFLP**
- **Nuclear microsatellites**
Morphometric assessment of caucasian honey bees
Distribution of *Est* allele frequencies in Turkey
Future Studies
Project underway: Central Anatolian Honeybee

Apis mellifera anatoliaca
Next coming project: Western Anatolian or Mugla Honeybee

Aegean meets Mediterranean, a place for pine honey
Day 1: 15 July Sunday - Kek答almans - Izmir - Izmir - Istanbul
Safar Hotel - Kek答almans - Harvey Hotel
Day 2: 16 July Monday, Kek答almans
After breakfast, visit to Panoramic Viewpoint at the Kek答almans Castle. Then transfer to the historical and cultural center of Izmir.
Day 3: 17 July Tuesday, Izmir
After breakfast, visit to the historical and cultural center of Izmir, including the Ataturk Museum, the Izmir Clock Tower, and the Kusadasi Museum.
Day 4: 18 July Wednesday, Izmir - Kusadasi - Bodrum
After breakfast, visit to the ancient city of Ephesus, the ancient city of Miletus, and the ancient city of Mykonos. Then transfer to the historical and cultural center of Kusadasi.
Day 5: 19 July Thursday, Kusadasi - Bodrum
After breakfast, visit to the historical and cultural center of Kusadasi, including the Mausoleum of Mausus, the Temple of Artemis, and the Black Church.
Day 6: 20 July Friday, Bodrum - Izmir - Istanbul
After breakfast, visit to the historical and cultural center of Bodrum, including the Bodrum Castle, the Bodrum Museum, and the Bodrum Archaeological Site.
Day 7: 21 July Saturday, Istanbul
Day 8: 22 July Sunday, Istanbul - Kek答almans - Izmir - Istanbul
Safar Hotel - Kek答almans - Harvey Hotel
End of the tour.

BEE SAFARI IN TURKEY 2012
By BIOTEMATUR / Sognotour
July 7-19

Bee Tour in Turkey

Nature Tours in Turkey

Biotematur - Sognotur, specialized agency that organizes nature tours in Turkey. We organize special tours for experts and professional naturalists. Our tours are supported by the international organization of ANG (www.ang.com) and the Foundation for Nature Protection. Our tours are supported by the ANG Foundation.

Safaris Offered by Biotematur / Sognotour

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