Conservation of the biodiversity of bee forage in Poland

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Pollinating insects in the wild environment of Poland

• In latitudes of Poland pollination is realized mainly by insects.

• The most efficient group of pollinating insects are individuals belong to Apidae family.

• However, honey bees pollinate more than 90% of plants.

• Nowadays the decline pollinators is noted, which relates to the degradation of their natural environment.
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Can we live without bees?

It is estimated that 57% of the world's plant species contributes in 80% to food of the human population.

We should to keep in mind, that up to 80% of these plants are pollinated by bees.

It was estimated, that about 1/3 of the products consumed by human population depends either directly or indirectly on pollination by insects.
Effect of bees on fruits or seeds harvest

<table>
<thead>
<tr>
<th>Plant</th>
<th>Yield obtained after pollination by bees</th>
<th>Yield without bees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trifolium pratense</td>
<td>99.9</td>
<td></td>
</tr>
<tr>
<td>Medicago sativa</td>
<td>98.7</td>
<td></td>
</tr>
<tr>
<td>Cucumis sativus</td>
<td>98.5</td>
<td></td>
</tr>
<tr>
<td>Prunus avium</td>
<td>98.4</td>
<td></td>
</tr>
<tr>
<td>Cerasus vulgaris (allog)</td>
<td>96.4</td>
<td></td>
</tr>
<tr>
<td>Vicia villosa</td>
<td>96.2</td>
<td></td>
</tr>
<tr>
<td>Prunus domestica (allog)</td>
<td>95.6</td>
<td></td>
</tr>
<tr>
<td>Phaseolus coccineus</td>
<td>93.5</td>
<td></td>
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<tr>
<td>Pirus communis</td>
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<td></td>
</tr>
<tr>
<td>Helianthus annuus</td>
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</tr>
<tr>
<td>Ribes nigrum</td>
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<tr>
<td>Malus domestica</td>
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<tr>
<td>Daucus carota</td>
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<tr>
<td>Allium cepa</td>
<td>88.7</td>
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<tr>
<td>Ribes grossularia</td>
<td>73.3</td>
<td></td>
</tr>
<tr>
<td>Fagopyrum esculentum</td>
<td>62.2</td>
<td></td>
</tr>
<tr>
<td>Cerasus vulgaris (auto)</td>
<td>58.3</td>
<td></td>
</tr>
<tr>
<td>Vicia faba</td>
<td>47.3</td>
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</tr>
<tr>
<td>Prunus domestica (auto)</td>
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<td></td>
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<tr>
<td>Brassica napus</td>
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</tr>
<tr>
<td>Rubus idaeus</td>
<td>28.5</td>
<td></td>
</tr>
<tr>
<td>Fragaria ananassa</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

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Measurable value of bee pollination

In the United States the annual value of pollination by honey bees is over $9 billion.

In Canada, the annual benefit for the human economy flowing for crops pollination rated at 443 million CanD.

In the UK the annual value of pollination by insects of 13 major field crops and 2 greenhouse crops is 202 millions £.

In the EU the activities of bees as pollinators of 30 most important entomophilous crops brings to the human economy annually, ca. 5 billion €.
The necessary conditions for existence of pollinating insects

- The appropriate place for nesting.
- Clean environment, best are the conditions for organic production.
- Abundance of food:
  - a lot of melliferous species of plants around,
  - bee forage must be spread evenly in time and space
- We can improve a bee forage flow conditions by increasing the biodiversity of bee forage plants.
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The necessary conditions for existence of pollinating insects...
What is the best way to conserve biodiversity of bee forage?

The crucial importance for the conservation of biological diversity in agricultural area are:

- buffer strips,
- ponds,
- boundary strips (balks),
- extensively used meadows and pastures.
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Arable areas tendencies in Poland (60% of country acreage)

• Intensification of agricultural production.
• Huge areas of monocultures and balks destruction.
• Chemical „war” against weeds (herbicides).
• An intensive crop protection against diseases and pests (mainly in horticulture production).
• We observe a massive quantitative and qualitative depletion of bee forage, with large disturbance of severity over time.
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How to increase the biodiversity of bee forage in the fields?

To encourage farmers to set up mid-field belts on agricultural land with melliferous plants as a forage for pollinating insects, including honeybees.

To expend some land (those most unfertile or temporarily excluded from the crop) for the cultivation of melliferous species supplying nectar and pollen for insects.
What species and areas?

• In the context of increasing biodiversity, each species of melliferous plants and its even the smallest area has a positive impact, especially on large monoculture areas.

• The mixture of melliferous plants sown in one period also can be used, as well as a set of diverse species on separate plots, but forming a food tape for insects.
The proposed surface and placement of plots with plants for bees

- It seems that on large monocultures, the boxes with melliferous plants should be as belts at 6 m in width stretching along the field with distance no more than 500 m from each other.
Support for farmers that start growing melliferous plants.

- Farmers do not harvest any crops from that acreage, reduce their income, and incur additional work and materials costs.
- Thus, the Polish government has prepared a project to pay farmers some kind of direct payments.
Collection of Honey Plants

- The collection of melliferous plants has been managed for many years in Research Institute of Horticulture, Apiculture Division in Pulawy.

- The primary goal of the task is to keep the collected taxa of melliferous plants and to spread the best one for beekeepers to improve bee forage and enhance the biodiversity of melliferous flora.
Collection of Honey Plants

- The collection counts over 290 species of melliferous plants.
- The bekeeping value estimation of collected species is conducted as well as some experiments, ie. with composition of special mixtures for honeybees.
- The plant collection is also used as a teaching and training ground for visiting beekeepers and students.
- We collect seeds of some species to spread the highest value plants among beekeepers.
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Summary

Increasing of bee forage biodiversity is both the chance and necessity.

For the apiculture industry it is a chance to diversification and improving the bee forage flow.

For the environment it is the essential necessity to preservation the natural balance of the environment's life.
Thank you for your attention