Neonicotinoids and their impact on ecosystem services in Tanzania

Mkabwa Lawrence Manoko Katambo
Department of Crop Sciences and Beekeeping Technology
+255 784315230
mlkmanoko@gmail.com; manoko@udsm.ac.tz

Special workshop on Neonicotinoids and their impact on Ecosystem Services for Agriculture in Africa
14-16 November 2018.

Neonicotinoids affects Bees more adversely than others insects

- Neonicotinoids are systemic insecticides
- Thus they target the nervous system of insects, blocking an acetylcholine receptor
- Bees have a particular genetic vulnerability to Neonics because:
  - they have more of these receptors than other insects,
  - have more learning and memory genes for their highly evolved system of social communication and organization,
  - unlike many insect pest species which are able to detoxify harmful chemicals, bees possess fewer genes for detoxification.
- Mega studies on the use of Notonectids pesticides by the European Food Safety Authority (EFSA) has concluded they pose a risk to wild bees and honeybees.

Source: http://www.pan-uk.org/about_neonicotinoids/
**Routes of Neonicotinoids exposure to Bees**

There about eight routes of exposure:

- Direct Contact
- Contaminated Pollen and Nectar
- Residue Contact
- Particles Released During the Planting of Coated Seeds,
- Contaminated Nesting Areas
- Contaminated Nesting Material
- Contaminated Water
- Guttation Fluid

---

**How the world will look like in absence of bees**

Photos: Effect of Shrinking Bee Populations in rural China, humans pollinate flowers by hand.

Hanyuan county the “world’s pear capital,” now viability of hand pollination is being challenged by rising labor costs and declining fruit yields.

Hypothetical view
Micronutrients availability depend on Pollination


Use of Pesticides in Tanzania


“Every person importing pesticides shall obtain a permit for importing that pesticide, from the Registrar”.

“All pesticides manufactured, formulated or compounded for disposal in any way for use in Tanzania, shall be registered in accordance with the Act and Regulations”.

“Every application for pesticide registration or renewal of registration shall be accompanied details information”
Information required

“A dossier containing additional information to determine the suitability of the pesticide as to its use and including technical data sheet and direction on how to detect and quantify the active ingredient;”

“A written declaration that the pesticide has or has not been banned or restricted in the country of origin”.

“Present a representative sample and a certificate of analysis if available”

“Every pesticide submitted for registration shall be submitted for analysis to Tropical Pesticide Research Institute (TPRI) that carry out field tests within three cropping seasons and laboratory analysis as are necessary to determine its suitability”.

What is not done and what have been observed by Beekeepers!

However, impacts to non target organisms (pollinators and natural enemies of pests) is not adequately studied in Tanzania

Beekeepers observation:
- Size of colonies small now than before
- Fewer colonies exhibited by empty hives
- Thus Low productivity of honey and beeswax

However there no studies have linked these observation to use of Neonicotinoids or other pests in Tanzania
**Disqualified pesticides**

In cases where a pesticide:-

a) is subject to Prior Informed Consent (PIC) procedure; or;

b) is highly toxic, persistent and biologically cumulative; or

c) causes poisoning effects to human and animals of which no effective antidote is available, the Registrar shall not register that pesticide.

### Neonicotinoids registered in Tanzania in 2018

<table>
<thead>
<tr>
<th>FAMILY</th>
<th>Number of Products registered</th>
<th>%</th>
<th>Formulation and Crops</th>
</tr>
</thead>
</table>
| Imidacloprid | 63                            | 47.4 | • Used in different Formulations  
|              |                               |     | • They of different length of residues toxicity  
|              |                               |     | • Control pests of Flowering and non Flowering crops  
|              |                               |     | • Used at different stages of crop development |
| Thiacloprid  | 23                            | 17.3 |                                                                                      |
| Thiamethoxam | 23                            | 17.3 |                                                                                      |
| Acetamiprid  | 21                            | 15.8 |                                                                                      |
| Clothianidin | 2                             | 1.5  |                                                                                      |
| Nitenpyram   | 1                             | 0.8  |                                                                                      |
| Nithiazine   | 0                             | 0.0  |                                                                                      |
| TOTAL        | 133                           |     |                                                                                      |

Dust, wettable powder, flowable, and microencapsulated formulations can cause severe losses of both foraging bees and hive bees as toxicity effects may remain in a hive for months preventing recovery.
In Tanzania honey bees are important

- National Beekeeping Policy was enacted in 1998
- Beekeeping Act was established 2002
- Beekeeping employs about 2 million Tanzanian
- Tanzania is second in production of Bee products (Honey and Beeswax) in Africa after Ethiopia
- The University of Dar es Salaam runs a BSc. in Beekeeping Science and Technology
- It is a source of food (e.g. honey, pollen and brood)
- Provides raw materials for beeswax candles and lubricants industries

Issues still hanging around globally on the ban of Nicotinoids

There are issues that require scientific sound explanations in relation to use of pesticides in agricultural production and food security:
Both pollination and Food production are important Ecosystem services

Synergy between Pollination and Pest control increase productivity

Observations
1. Exists a synergistic interaction between pollination and pest control: the gain in seed set obtained when simultaneously increasing pollination and pest control were increased
2. These results outweighed the sum of seed set gains obtained when each service is increased separately.
3. Increased productivity has been the major driving force for use of pesticides.

Crop loss to pests is a major problem for farmers


Choice of pesticide to use is determined by farmers income

Example 1: Global potential and actual yield losses for key crops 2001-2003

Crop:  
Soybean
Rice

Relative yield loss (%)
Actual yield loss
Potential yield loss

WHO Ia & Ib Carbamates Organophosphates
***
Pyrethroids ***

Farmers with lower income use pesticides regardless of their effects to the agricultural ecosystem services provisioning

POVERTY-ENVIRONMENT REPORT: PESTICIDE USE IN THE MEKONG DELTA, VIETNAM-Craig Meisner, DECRG-IE 2005
No data for Pollination for agricultural dependence - African economies

No data for most of African countries
While Most African economies are Agricultural dependent

The ban on Neonicotinoids is challenged by some

- European Union expands ban of three neonicotinoid pesticides

  By Erik Stokstad Apr. 27, 2018, 2:45 PM


- The European Union today expanded a controversial ban of neonicotinoid pesticides, based on the threat they pose to pollinators. The decision pleased environmental groups and was greeted with trepidation by farming associations, which fear economic harm.

- Only France has banned the five neonicotinoid pesticides but not the other EU countries
Maintaining the Components of a ecosystem for its health is important

A healthier ecosystem will allow:
• Energy flow between trophic levels
• Nutrients cycling
• Biogeochemical cycles

Thank you