

# Status of Neonicotinoids use and possible impact on ecosystems services in Botswana

Motshwari Obopile

Department of Crop Science and Production  
Botswana University of Agriculture and  
Natural Resources  
Gaborone, Botswana

[www.buan.ac.bw](http://www.buan.ac.bw)

## INTRODUCTION

- Economy of Botswana has historically been agriculturally based
- In 1967 diamonds were discovered, agricultural sector contribution GDP drastically declined from over 80% to 2.4%
- Partly, reflecting rapid expansion of other economic activities
- Botswana is a net importer of most agricultural products, except beef and its by-products.
- Is a net importer of food grains and horticultural produce
- At farm level, a great majority of rural dwellers depending on agriculture are net food buyers

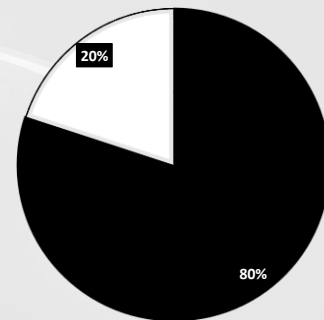
[www.buan.ac.bw](http://www.buan.ac.bw)

## Contribution of agriculture to GDP

- Farm level assistant incentives:
  - Financial Assistance Policy (FAP)
  - Citizen Entrepreneurial Development Agency (CEDA)
  - National Master Plan for Arable Agriculture and Dairy Farming (NAMPAAD)
  - Integrated Support Programme for Arable Agricultural Development ( ISPAAD)

CONTRIBUTION OF LIVESTOCK AND CROP PRODUCTION TO AGRIC SECTOR

■ livestock □ crops



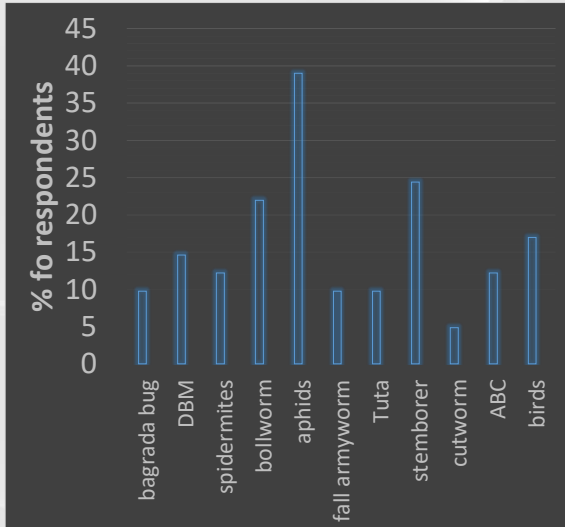
[www.buan.ac.bw](http://www.buan.ac.bw)

## Constraints to low arable productivity

- Pests and diseases
- Water shortage
- Poor soil fertility
- Weeds
- Lack of Market
- Lack of Labour
- Lack of irrigation facilities
- Wildlife damage
- Poor Transport
- Lack of capital
- Poor management

[www.buan.ac.bw](http://www.buan.ac.bw)

## Pests and damage



[www.buan.ac.bw](http://www.buan.ac.bw)

## Pesticides previous used

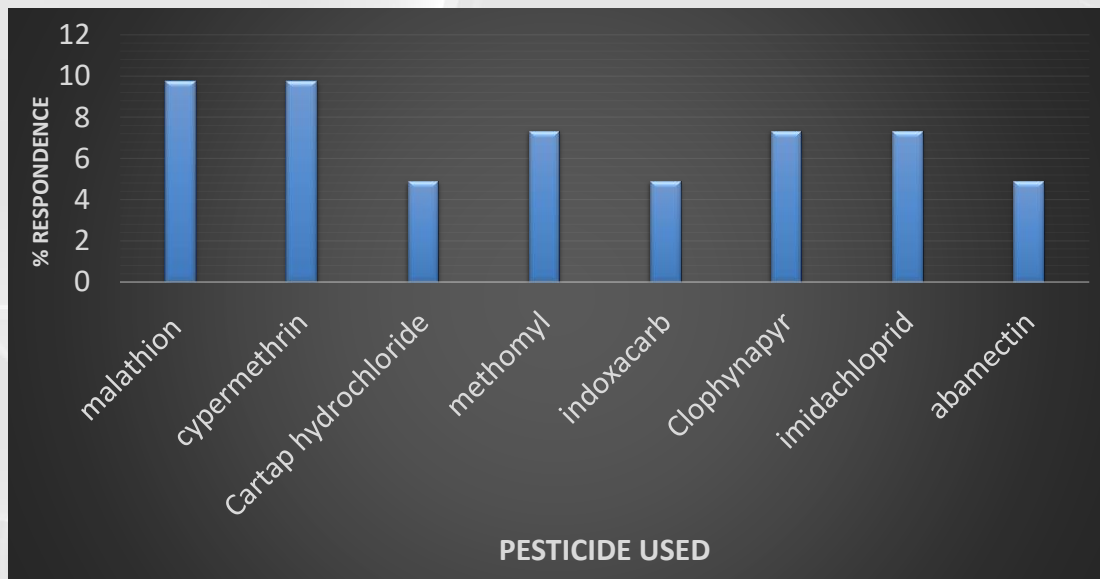
Active ingredient	crop	Target pest/disease
Cypermethrin (pyr)	Tomato, onions,	<u>H. armigera</u> , <u>P. xylostella</u> , <u>B. brassicae</u>
Malathion (OP)	Butternuts, brassicae,	<u>Bactrocera</u> spp., <u>T. tabaci</u> , <u>P. xylostella</u>
Alpha-cypermethrin (Pyr)	Tomato, brassicae	<u>H. armigera</u> , <u>B. hilaris</u> , <u>B. Brassicae</u>
Dimethoate(OP)	brassicae, onion	<u>B. brassicae</u> , <u>T. tabaci</u>
Chlorpyrifos (OP)	Tomato, cabbage	<u>H. armigera</u> , <u>P. xylostella</u> ,
Methomyl (Carb)	Brassicae, tomato	<u>P. xylostella</u> , <u>H. armigera</u>
Carbaryl (Carb)	Tomato, cabbage	<u>Agrotis</u> spp.
Fenthion (OP)	Butternuts	<u>Bactrocera</u> spp
Diazinon (OP)	Butternuts, onion	<u>Bactrocera</u> spp.

[www.buan.ac.bw](http://www.buan.ac.bw)

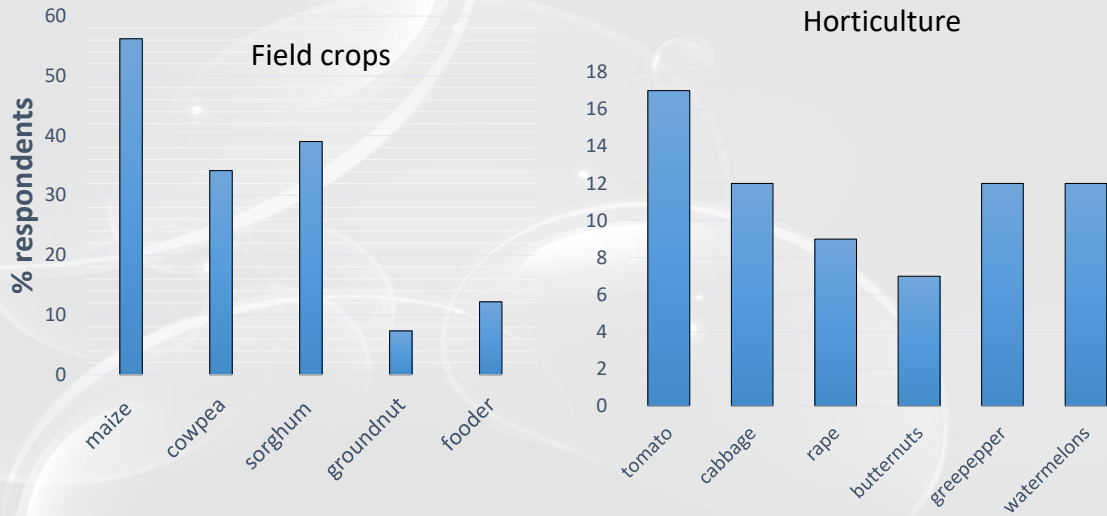
Demeton-s-methyl (OP)	brassicae	<u>B. brassicae</u>
Trichlorfon (OP)	tomato	<u>L. trifolii</u>
Endosulfan (OC)	Tomato, onion, cabbage	<u>H. armigera</u> , <u>T. tabaci</u>
Deltamethrin (Pyr)	Brassicae, onion	<u>T. tabaci</u> , <u>B. hilaris</u>
Parathion (OP)	Cabbage, onion	<u>B. hilaris</u>
Dichlorvos (OP)	Brassicae	<u>P. xylostella</u> , <u>B. brassicae</u>
Methamidophos (OP)	Tomato, cabbage	<u>B. brassicae</u> ,
Beta-cyhalothrin (Pyr)	tomato	<u>Tetranychus</u> spp.
Chlorphenapyr (Prz )	Tomato, cabbage	<u>Tetranychus</u> spp. <u>P. xylostella</u>
Abamectin (Avermetin)	Tomato	Tetranychus spp.
Fenamiphos(OP)	Tomato, spinach	<u>Meloidogyne</u> spp.
Carbofuran (Carb)	Cabbage	<u>B. hilaris</u>

[www.buan.ac.bw](http://www.buan.ac.bw)

## Survey of neonicotinoids and other pesticides



## Survey on neonicotinoids knowledge



[www.buan.ac.bw](http://www.buan.ac.bw)

## Ecosystem services studied in Botswana

- Natural pest control (predators and parasites)
  - ✓ Stemborer, aphids
- Cultural control (Crop diversity)
  - ✓ Stemborers and aphids
- Provisioning services
  - ✓ Source Food (directly and indirectly)



[www.buan.ac.bw](http://www.buan.ac.bw)

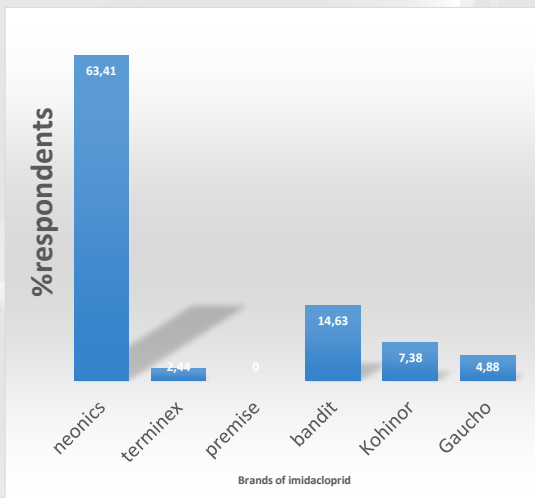
# Ecosystem services

## Biological Nitrogen fixation

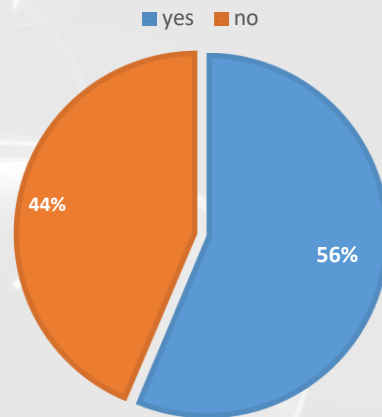
Herbaceous wild and domesticated legumes provide nitrogen to poor soils



# Neonicotinoid use and impact



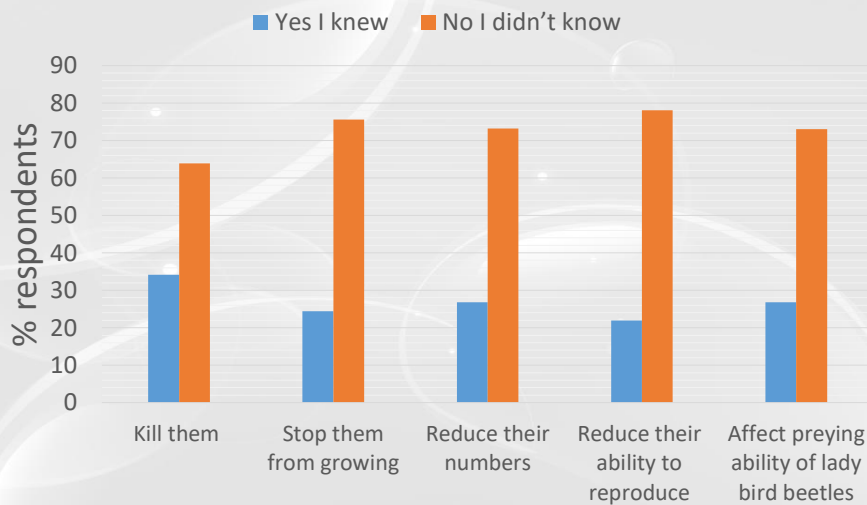
DO NEONICOTINOINDS HAVE IMPACT ON ECOSYSTEM SERVICES



## Knowledge on possible impact of Neonics

beneficial	Yes	Don't know
Honey bees	53.66	46.34
Butterflies and moths	48.78	51.22
Parasitic wasps	41.46	58.54
Lacewings	41.46	58.54
Carabidae beetle	39.02	60.98
Ladybird beetle	51.22	48.78
Spiders	43.90	56.10
Dragon flies	41.46	58.54
Earthworms	31.71	68.54

## How will neonics Impact non target organisms ?



## Summary

- More than 50 % of respondents knew neonicotinoids and believe that they can negatively impact ecosystems services
- Imidacloprid is the only registered neonicotinoid in Botswana
- Supplied in different brands
- In crop production imidacloprid is used to control different sucking insect as foliar application

[www.buan.ac.bw](http://www.buan.ac.bw)

## Summary

- Also used to control termites and destruction of termites mounds by poisoning the colony
- Very rarely used to treat seed before planting
- In construction it is used to control termites in buildings or as insect proofing at the beginning of construction



[www.buan.ac.bw](http://www.buan.ac.bw)



## What are implications

- As crop production increase more pesticides will be used including neonicotinoids
- As more old chemicals (Ops, POPs etc) are banned, the use of neonicotinoids will increase as has happened elsewhere
- Given their potential negative impact on ecosystems services, research on their impact in Africa will be critical



[www.buan.ac.bw](http://www.buan.ac.bw)

*Thank you*



[www.buan.ac.bw](http://www.buan.ac.bw)



**BUAN**  
BOTSWANA UNIVERSITY OF  
AGRICULTURE AND NATURAL RESOURCES

# Acknowledgments



## Botswana Academy of Sciences



[www.buan.ac.bw](http://www.buan.ac.bw)