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Development of IPM strategies on field insect pests of cruciferous vegetables (Brassica spp.)

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Introduction

- Around 16 insect species have been reported on cruciferous vegetables in Cambodia (CABI, 2007; GDA and JICA, 2011).

- Eng et al, 2015 and Soeurn et al, 2015 have found that farmers in Kandal and Battambang province sprayed a mixture of 4-6 pesticides with at least 3 pesticide applications weekly.

What's in the media?

The Phnom Penh Post

Worries over pesticide use

Tue, 11 January 2011 Rebecca Puddy and Khouth Sophak Chakrya

WHEN Yorn Makara sprays pesticides on his morning glory crop at Boeung Tompun lake, on the outskirts of Phnom Penh, he copies how his parents once used the chemicals, because he can't read the instructions on the bottle.

"I buy pesticides and chemicals to mix in a container with water and the instructions are mostly written in the Thai or Vietnamese languages," Yorn Makara says. "I know the chemical protects my crops from pests because I look at the pictures on the bottle."

While Yorn Makara knows the pesticides are effective at killing pests, he can't be certain of the dangers the pesticide poses to his health, as he can't read the safety information.

According to a new study on pesticide use in Phnom Penh, Yorn Makara is not alone.

The study, conducted by researchers at the University of Copenhagen in Denmark, found most farmers at neighbouring Boeung Cheung Ek lake had a limited understanding of how to protect themselves from dangerous pesticides, resulting in 88 percent of those surveyed reporting symptoms of acute pesticide poisoning.

"The main issue we uncovered in BCE lake was the heavy and frequent use of pesticides which have been banned or restricted by the Cambodian government," said Hanne Klith Jensen, head researcher of the study which focussed on the farming practices of morning glory aquaculture farmers in Thnout Chrum and Kba Tumnub villages.

http://bit.ly/1N9xplO

What's in the media?

Voice of America

Pesticides Continue to Harm Cambodia's Farmers

http://bit.ly/1N9vL3K

Print Comment Share:

Cambodian farmers work on the rice field in Kampong Speu province, west of Phnom Penh, (File)

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Robert Carmichael
January 23, 2011 7:00 PM

A new study shows that many Cambodian vegetable farmers suffer from acute pesticide poisoning. It is the latest to indicate that Cambodia, like many other developing nations, is struggling to protect farmers and consumers from the dangers of pesticides.

បន្លែកម្ពុជាជាប់ក្នុងបញ្ជីខ្មៅរបស់ទីផ្សារអឺរ៉ុប

ចេញផ្សាយនា: 14 សីហា 2015
ជំពូក: ព័ត៌មានជាតិ

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http://bit.ly/1hEbYwz

ភ្នំពេញ ៖ មន្ត្រីជាន់ខ្ពស់ក្រសួងកសិកម្ម បានថ្លែងថា បរិមាណនៃការនាំចេញបន្លែរបស់កម្ពុជាទៅកាន់ទីផ្សារអឺរ៉ុបមានការធ្លាក់ចុះយ៉ាងគំហុកបន្ទាប់ពីអ្នកជំនាញផ្នែកភូតគាមអនាម័យអឺរ៉ុបរកឃើញថា កម្ពុជាគឺជាកន្លែងប្រមូលផ្តុំសត្វល្អិតចង្រៃ។ អគ្គនាយករងនៃអគ្គនាយកដ្ឋានកសិកម្ម ឯកឧត្តម ហ៊ាន វណ្ណហន បានឲ្យដឹងកាលពីពេលថ្មីៗនេះថា កន្លងមកកម្ពុជាធ្លាប់បាននាំចេញបន្លែ-ផ្លែឈើទៅកាន់សហគមន៍អឺរ៉ុប។ប៉ុន្តែកាលពីឆ្នាំ២០១៤សហគមន៍អឺរ៉ុបបានរកឃើញថាកម្ពុជា មិនមានមន្ត្រីភូតគាមអនាម័យតាមច្រកទ្វារព្រំដែនដើម្បីត្រួតពិនិត្យបន្លែនាំចូលពីប្រទេសជិតខាងឡើយដែលជាហេតុធ្វើឲ្យកម្ពុជាក្លាយទៅជាកន្លែងប្រមូលផ្តុំប្រភពសត្វល្អិតចង្រៃលើបន្លែ។ជាមួយគ្នាសហគមន៍អឺរ៉ុបក៏បានជូនដំណឹងមកកម្ពុជាអំពីភាពមិនអនុលោមនិងបញ្ហាជាច្រើនពាក់ព័ន្ធនឹងបន្លែដែលនាំចូលពីកម្ពុជាផងដែរជាពិសេសពាក់ព័ន្ធនឹងសត្វល្អិតនិងស្មៅចង្រៃ។

Introduction

- Ecological damage due to widespread use of synthesis pesticides (Antonious, 2003; 2004).
- Pesticide contamination problems (Wang et al, 2011; Neufeld et al., 2010)

Introduction

- Tomato, clover and onion have been studied as intercropping with cruciferous vegetables extensively while lemongrass, sweet basil, holy basil and green onions are relatively low.

Materials and Methods

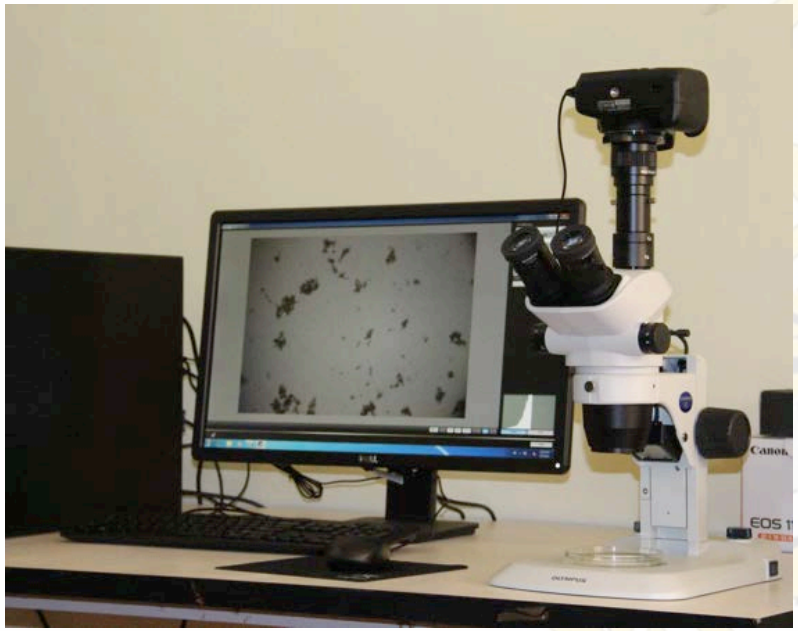
Dry season in 2015

Materials and Methods

- Experimental design
  - 2014 treatments: lemongrass (*Cymbopogon citratus*), green onions (*Allium fistulosum*), sweet basil (*Ocimum basilicum*) and non-barrier
  - 2015 treatments: sweet basil, holy basil (*O. tenuiflorium*), yellow sticky trap, plastic barrier and non-barrier

Materials and Methods

- Sampling method

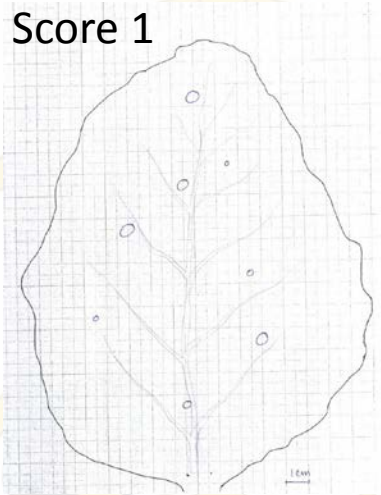


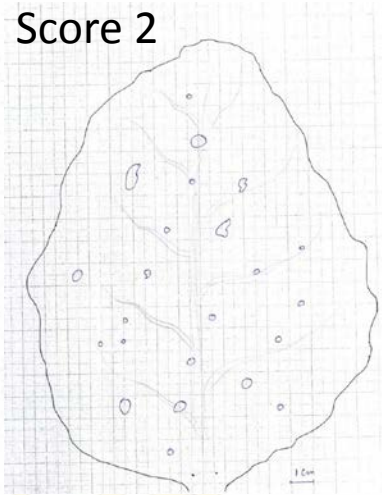
Olympus SZ61 microscope equipped with CANON EOS 1100D camera

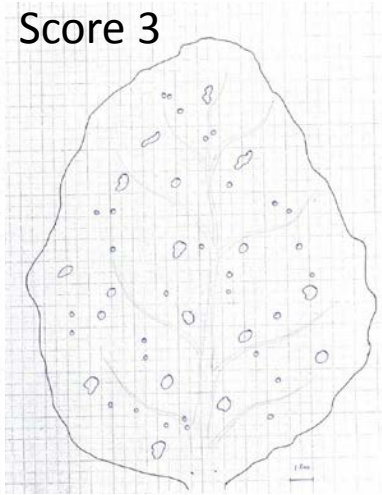
Materials and Methods

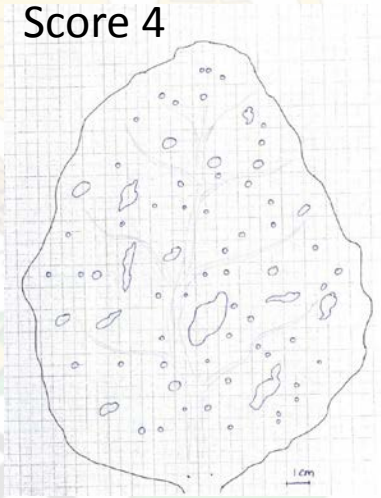
Scoring holes on leave

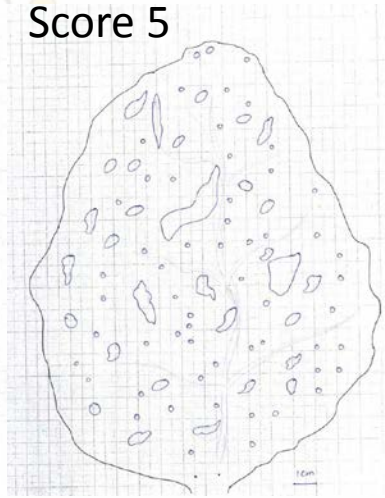
- Score 0: no damage
- Score 1: 1%
- Score 2: 2-5%
- Score 3: 6-10%
- Score 4: 11-30%
- Score 5: >30%











Kianmatee and Ranamukhaarachchi, 2007

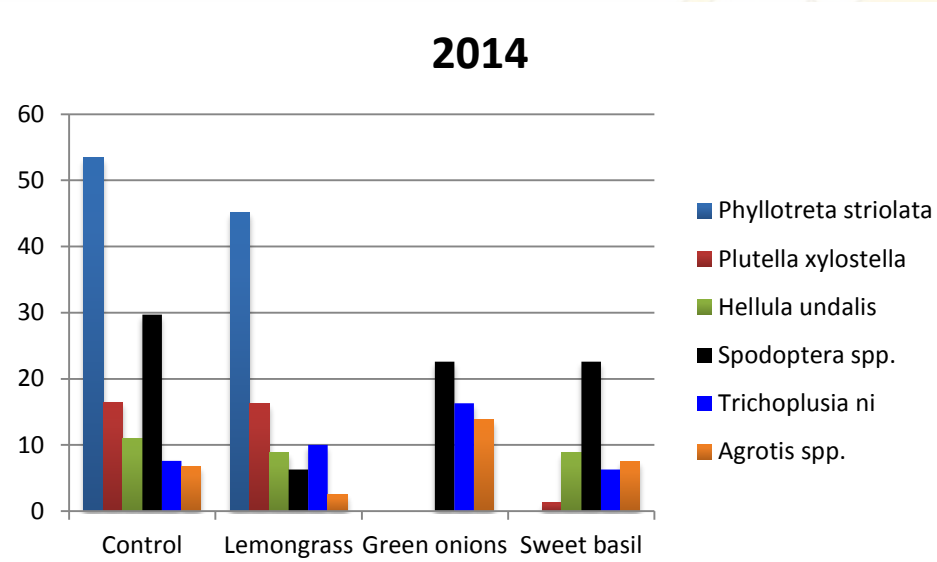
Results and discussion

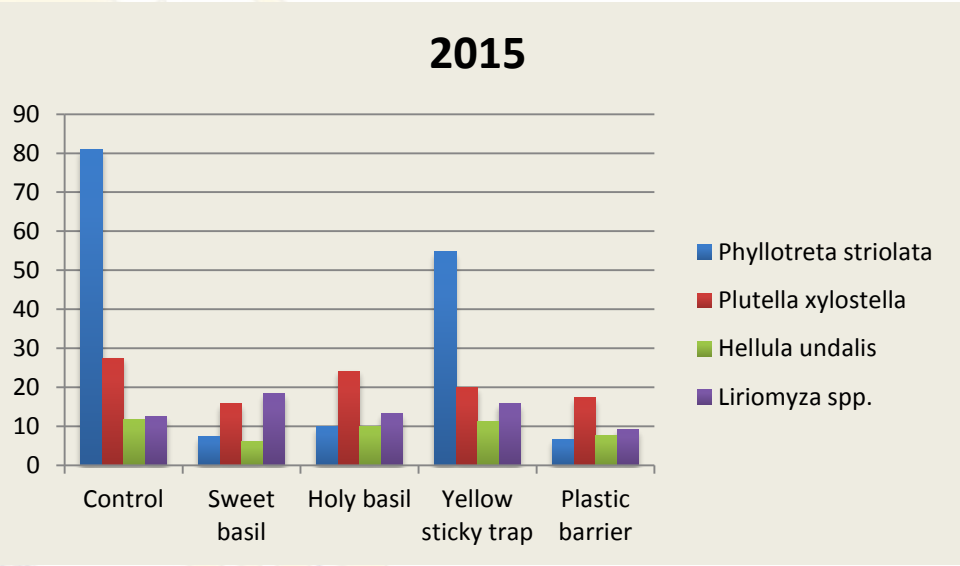
- Occurrence of insect pests in the dry season of 2014 and 2015

Order	Family	Scientific name	English name
Coleoptera	Chrysomelidae	*Phyllotreta striolata*[1, 2]	Cabbage flea beetle
Diptera	Agromyzidae	*Liriomyza* sp.[2]	Leaf miner
Lepidoptera	Crambidae	*Hellula undalis*[1, 2]	Webworm moth
Lepidoptera	Noctuidae	*Spodoptera spp.*[1]	Army worm
Lepidoptera	Noctuidae	*Agrotis sp.*[1]	Cutworm
Lepidoptera	Noctuidae	*Trichoplusia ni*[1]	Cabbage looper
Lepidoptera	Plutellidae	*Plutella xylostella*[1, 2]	Diamondback moth

Results and discussion

- Abundance of insect pests in the dry season of 2014 and 2015





Results and discussion

- Pliny the Younger (23-79AD) wrote in his ***Naturalis Historiae*** that when rape (*Brassica napus* L.) and vetch (*Vicia sativa* L.) were grown together, many insects that occurred normally on these plants were not found (Schoonhoven *et al.*, 1998).
- Reduce primarily colonization (odors emanating from nonhost plant may also **disrupted** the attraction of pests to host plants – Finch et al, 2003; Finch & Collier, 2000; Finch, 1996; Vandermeer, 1989; Root, 1973).

Results and discussion

- Population of ***P. striolata*** increase in monoculture and decrease in diculture with non-host (Weiss, 1994; Garcia and Altieri, 1992; Elmstrom et al, 1988) except lemongrass.

- Plants with aromatic quality contain volatile oils that may interfere with host plant location, feeding, distribution and mating, resulting in decreased pest abundance (Lu et al, 2007; Stan et al, 2003; Uvah and Coaker, 1984; Tahvanainen & Root, 1972)

Results and discussion

- Sweet basil had the lowest number of **P. *striolata*** and ***Hellula undalis*** while Lemongrass had the lowest number of ***Spodoptera* spp.** (Kianmatee and Ranamukhaarachchi, 2007)
- Neave et al (2011) used exclusion net successfully for pest management on cabbage in the Solomon Islands. Asman et al (2001) have concluded that the high barriers could possibly reduce the spread of **P. *xylostella***.
- Yellow sticky trap could be used partially to control **P. *xylostella*** (Rushtapakornchai et al, 1990)

Results and discussion

- Allium species (onion) intercropping with cruciferous vegetables and reduce ***Hellula undalis*** (Debra and Misheck, 2014; Baidoo et al, 2012), flea beetle (Gao et al, 2004) but not ***Plutella xylostella***.

Results and discussion

- Indication of crop growth in 2014

Treatments	Plant height (cm)	Leaves number /plant	Weight /plant (g)	Leaf area (cm^2)	% of damaged leaf area (score)	Un-damaged yield (t/ha)	Damaged yield (t/ha)	Total yield (t/ha)
Control	18.35	5.3b	83.5b	112.925	3.5a	13.9375c	2.4375ab	16.375b
Lemon grass	21.9	5.65ab	87.45ab	118.44	2b	14.55bc	2.575ab	17.125b
Green onions	23.45	5.95a	91.275a	132.45	2b	17.3125a	2.6875a	20a
Sweet basil	22.6	5.65ab	89.4a	131.55	2b	16.775ab	1.85b	18.625ab
ANOVA	ns	*	*	ns	**	*	*	*
CV	25.60	6.7	4	14.68	20.99	10.98	19.61	9.78

Results and discussion

- Indication of crop growth in 2015

Treatments	Plant height (cm)	Leaves number/ plant	Weight /plant (g)	Leaf area (cm^2)	% of damaged leaf area (score)	Un-damaged yield (t/ha)	Damaged yield (t/ha)	Total yield (t/ha)
Control	29.75b	5.65b	60.35b	109.24b	3.32a	7.31	2a	9.31
Sweet basil	31.05b	5.45b	63.45b	114.38b	2.28b	8.33	1.5ab	9.83
Holy basil	31.7b	5.9ab	67.65b	124.02b	2.38b	10.63	0.75bc	11.38
Yellow sticky trap	31.4b	5.8b	65.65b	118.16b	2.38b	9.43	1c	10.43
Plastic barrier	38.15a	6.8a	120.2a	187.81a	2.07b	11.57	0.5c	12.07
ANOVA	*	*	**	**	**	ns	**	ns
CV	11.30	10.27	18.30	21.28	21.29	30.88	24.14	27.58

Conclusion

- Green onions, sweet basil and holy basil are potential in reducing major pests: P. *xylostella*, P. *striolata* and H. *undalis* while lemongrass is great in reducing *Spodoptera* spp.
- Non-living barrier (plastic barrier) will also be a promising management for a small farm.
- This partial management is not yet sufficient, a combination with other management options will be a good complementation.

On-going for 2016

Demonstration

Demonstration

Demonstration

Demonstration