Food Exploitation by *Heterotrigona itama*: Trade-off Between Nectar Reward and Distance

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Background

- Bees rely almost exclusively on nutrients derived from flowers such as nectar and pollen.

- Nectar serves as the main carbohydrate source for bees.
  - Some species may have a preference for nectar of different sugar concentrations.

Previous study

insects

MDPI

Preferred sugar concentration

Foraging distance

Article

Food Reward and Distance Influence the Foraging Pattern of Stingless Bee, *Heterotrigona itama*

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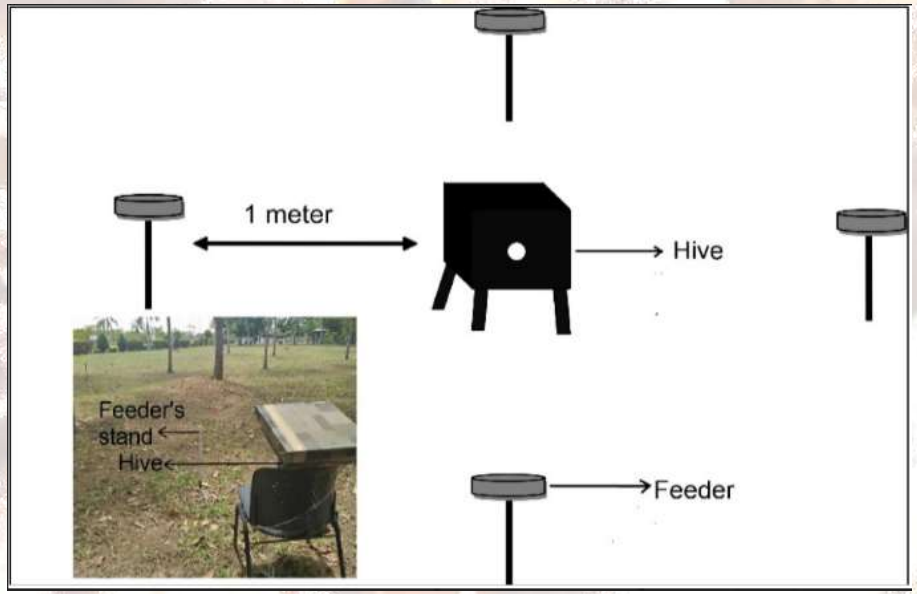
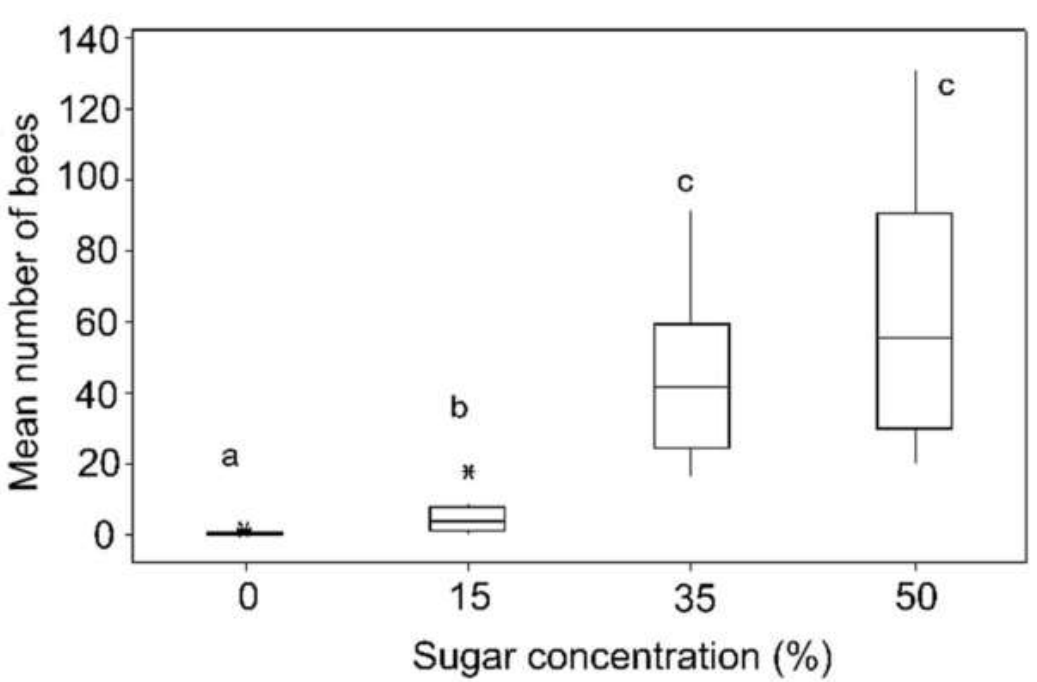
Abstract: Beekeeping with stingless bee provides new opportunities to improve the incomes of many

Previous study

- ***H. itama*** **prefers to exploit food contains sugar concentration of 35% and above.**

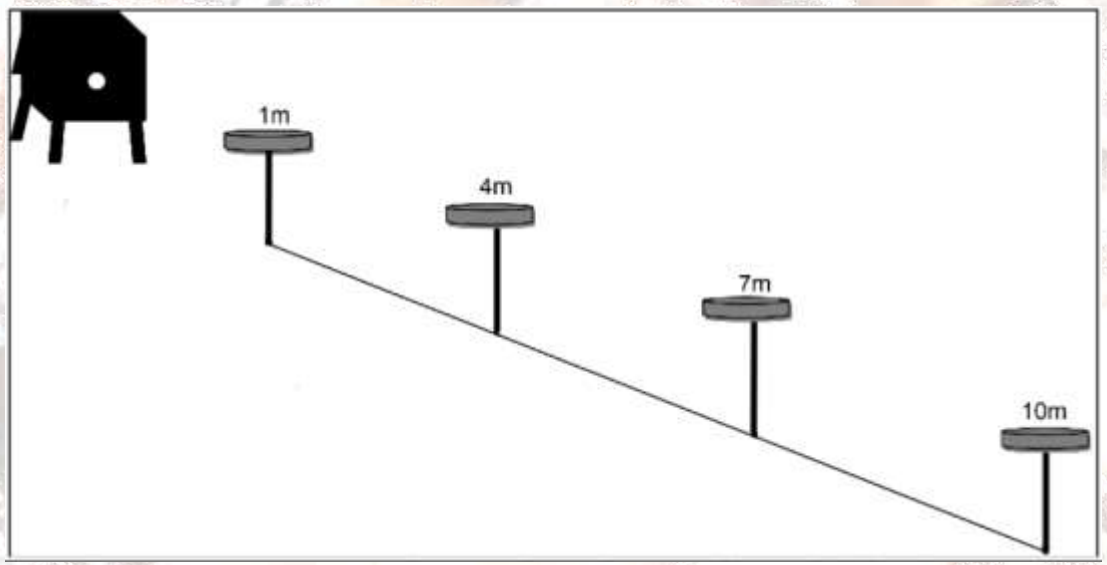


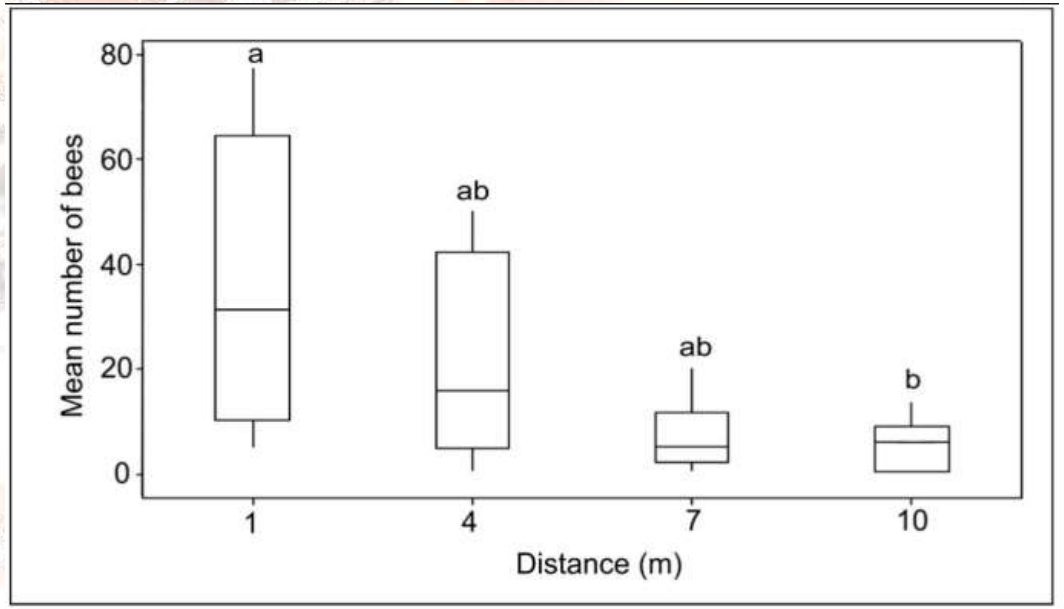


(Basari et al., 2018)

Previous study

- If the food sources with the same reward (50%) are abundant, it prefers to collect food sources that are nearer to the hive (1 m until 7 m from the hive).





(Basari et al., 2018)

current study

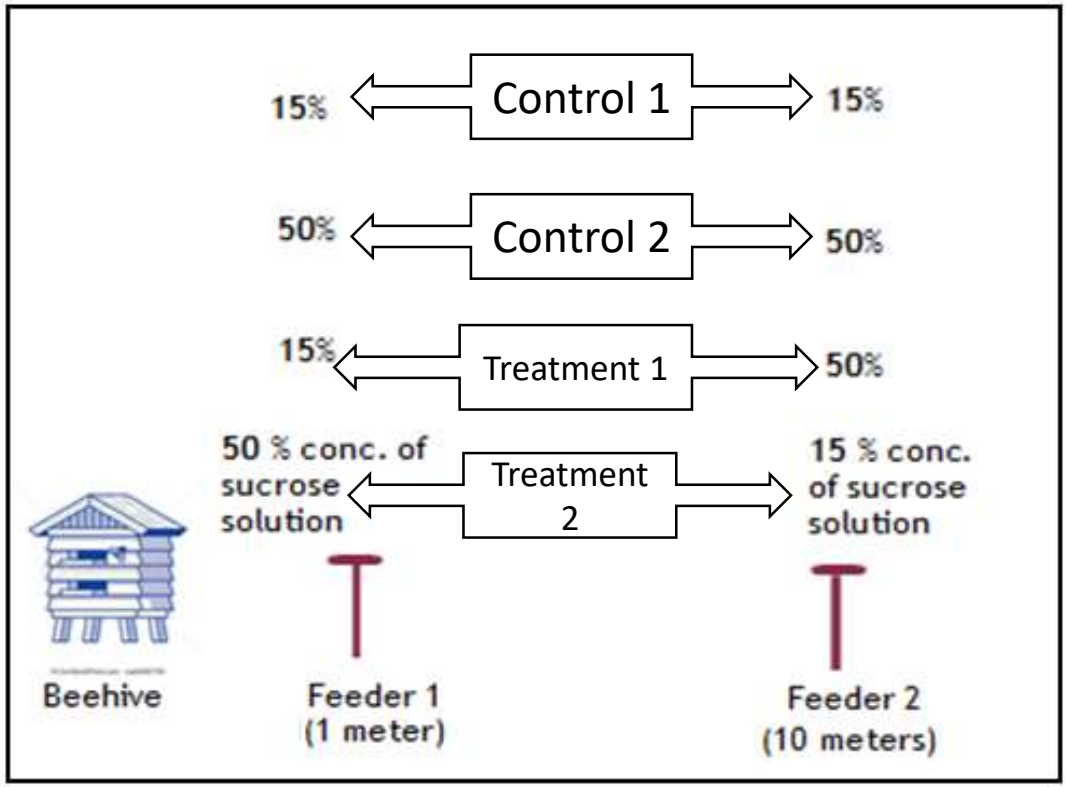
Which factor is more important for the bee during foraging? Nearer sources but less quality (less nectar sugar concentration) versus further sources but high quality?

justification

- Help farmers to arrange suitable flowering plants around their farms as food sources for the bees.
- Increase food exploitation by *H. itama* -> increase honey production.
- Sustain food sources for the bees -> sustain both domesticated and wild colonies.

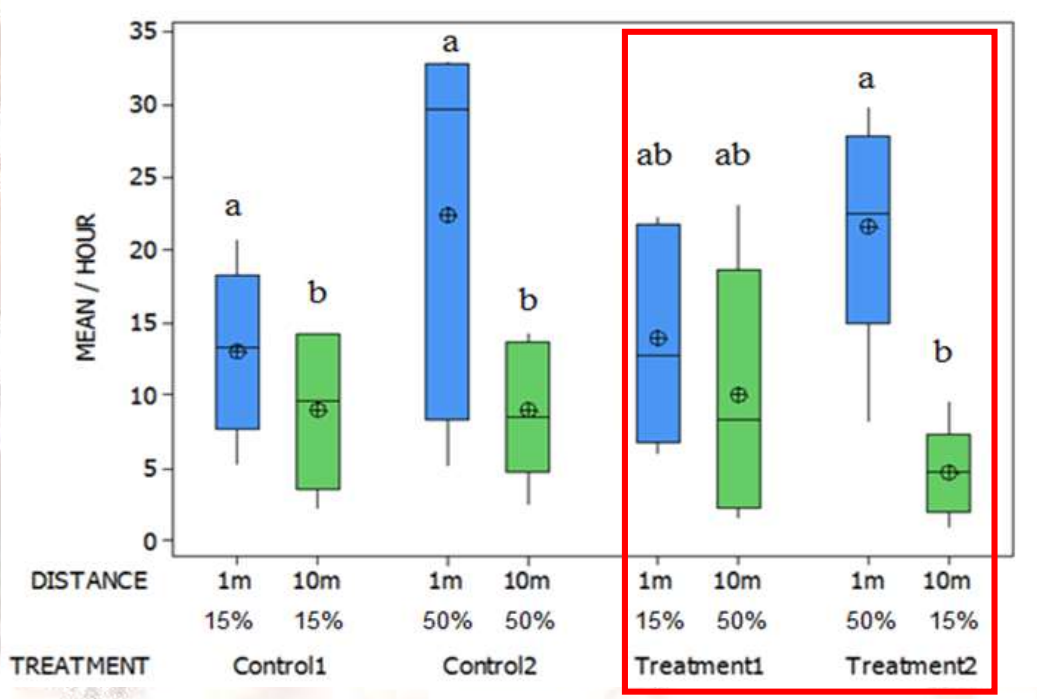
Methodology

Experimental set-up



Experimental design

Result summary



Two-way ANOVA, $p<0.05$

i) Significant difference in the number of bees visited food sources located at 1 m vs 10 m in both control experiments.

ii) If food with 50% sugar concentration was placed further away from hive, the bees will still fly further to collect the food.

Discussion & conclusion

- *H. itama* chose to trade-off between nectar reward and distance whereby food reward was found to be more important compared to the food distance.
- The bees will fly further to exploit food source that give them better reward/quality (high sugar nectar concentration).

Discussion & conclusion

- Bees seem to prefer higher over lower nectar sugar concentrations (65-35% as optimal nectar concentrations (Pamminger et al., 2019)) but they will also collect nectar with sugar concentrations below that value under natural conditions.

- Social bees avoid foraging on nectar sources below 20% sugar concentration-
  - the caloric intake cannot support sustained foraging activity.
  - Reduce colony fitness.

(Maurizio & Grafl, 1980; Roubik & Buchmann, 1984; Cnaani, Thomson & Papaj, 2006).

Ongoing research: nectar of Flowers visited by *h. itama*

Antigonon leptopus (Honolulu creepers)

Asystasia gangetica (Chinese violet)

Calliandra haematocephala (powder puff)

Turnera sabulata (white buttercup)

Wrightia antidysenterica (White angel)

Averrhoa carambola (star fruit flower)

Murraya paniculata (Jasmine orange)

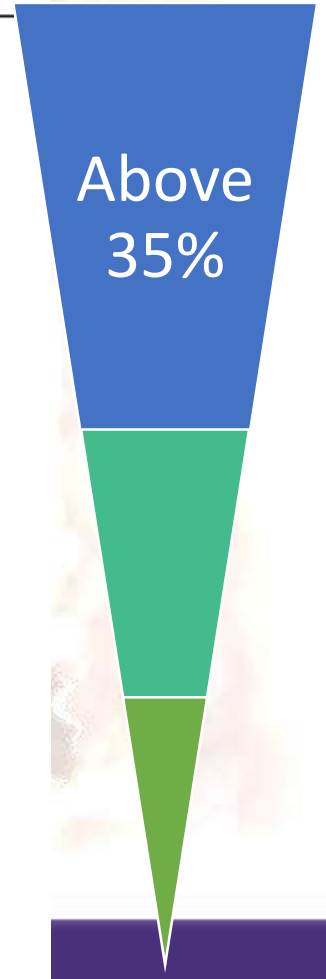
Melastoma malabathricum (Bunga senduduk)

Wrightia religiosa (water jasmine)

Ipomoea cairica (Morning glory)

Ongoing research: nectar of Flowers visited by *h. itama*

NO.	Species name / Local name	Mean sugar nectar concentration ± SE (%)
1	*Averrhoa carambola*/ starfruit flower	43.36 ± 2.55
2	*Ipomea* sp. / Morning glory	38.69 ± 2.57
3	*Asystasia gangentica micrantha* / Chinese violet	37.96 ± 2.31
4	*Murraya paniculata* / Orange jessamine	35.18 ± 1.63
5	*Antigonon leptopus* / Coral vine	34.4 ± 2.11
6	*Melastoma malabathricum* / Senduduk	31.22 ± 1.80
7	*Turnera sabulata* / White buttercup	28.1 ± 1.53
8	*Calliandra haematocephala* / Red powder puff	27.7 ± 2.13
9	*Wrightia religiosa* / Water jasmine	25.86 ± 1.62
10	*Wrightia antisendentrica* / White angel	20.86 ± 1.54



conclusion

- It is important to understand the bees foraging behaviour so that we could arrange the bees colonies and food sources accordingly in the farm so that the bees could exploit the sources better and produces better yield for the beekeepers.
- Most importantly helps to sustain the domesticated colonies.

Source: https://romancingthebee.wordpress.com

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The Nestmates

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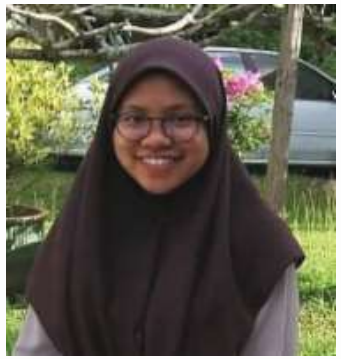

Ms. Nur Adawiyah Abdul Mutalid

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TERIMA KASIH / *THANK YOU*

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