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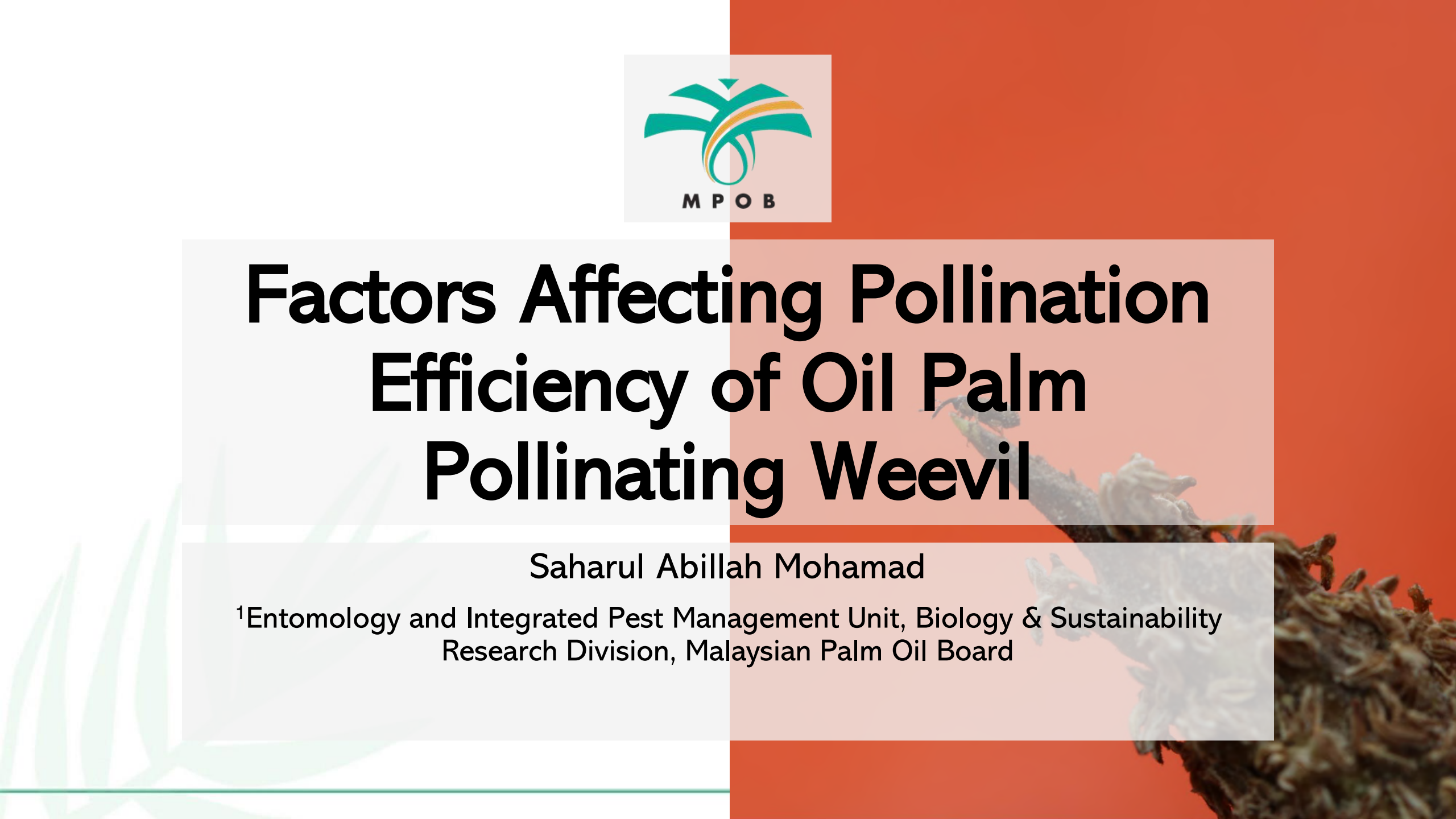
- Academic Qualifications
  - BSc (Hons.) Plantation Technology & Management, Universiti Teknologi MARA
- Work Experiences/ Area of Expertise/Interest
  - Universiti Teknologi MARA Sarawak (2010-2014)
  - Research Officer, Entomology & Integrated Pest Management Unit, MPOB (2014-Present)
  - Areas of expertise: Applied entomology/pest control
  - Research experiences and current research project
    - Research on oil palm bunch moth and termite control
    - Population monitoring of oil palm pollinating weevil
    - Fruit set formation in oil palm
    - Rat control in oil palm

MPOB soppoa
Seminar on R&D Progress 2023
15 Nov 2023, Bintulu, Sarawak

Factors Affecting Pollination Efficiency of Oil Palm Pollinating Weevil

Saharul Abillah Mohamad

[1]Entomology and Integrated Pest Management Unit, Biology & Sustainability Research Division, Malaysian Palm Oil Board

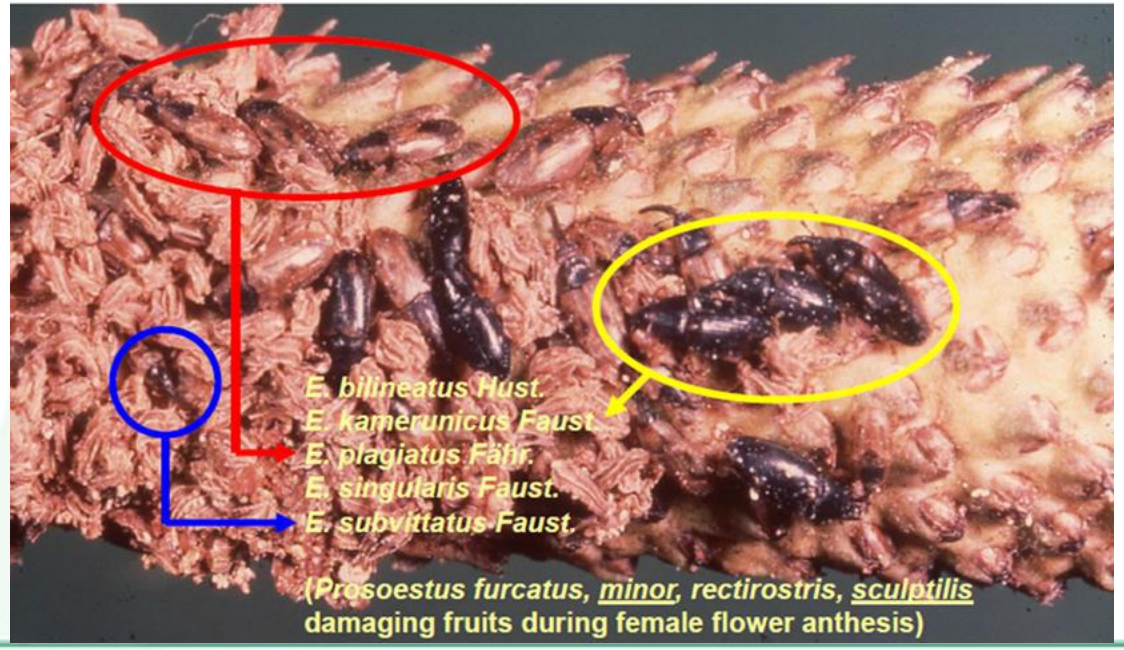


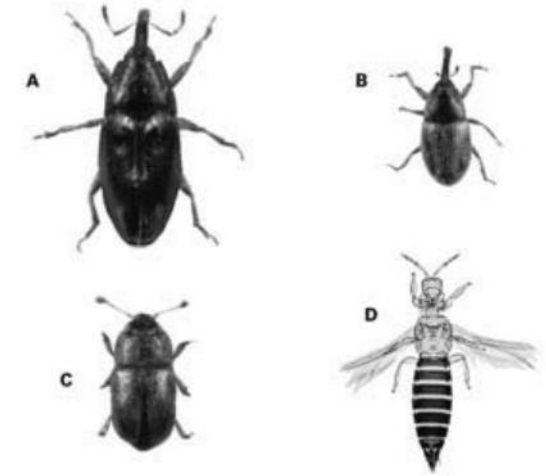
Outline of the Presentation

- Introduction
- Status of fruit set formation in study sites in Malaysia
- Looking into factors influencing the pollination rate of oil palm
- Conclusions
- Take-home message

Pollination in Oil Palm

- Transfer of pollen grains from male flower to female flower
- Main pollination agents: wind & insects








Phenological Stages of Oil Palm Inflorescences

- Male inflorescences: PS603, PS607 and PS609



- Female inflorescences: PS602, PS607 and PS609

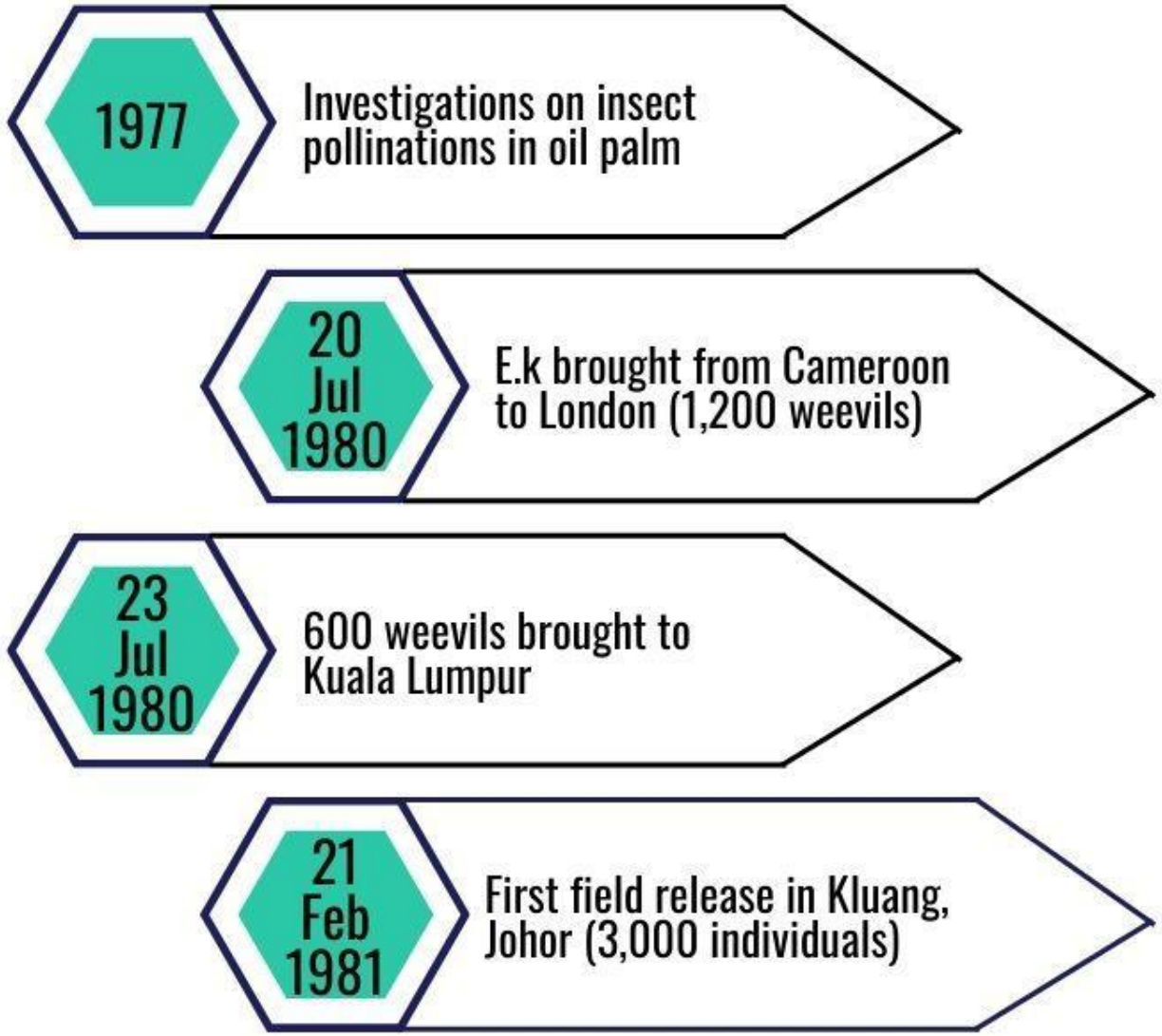
POLLINATION OF OIL PALM IN MALAYSIA

- Indigenous pollinating insects; Thrips & *Pyroderces* sp. moth
- Unsatisfactory fruit set in young palm.
- To improve FFB yield - assisted pollination by hand was developed but it is labour intensive and costly.

Pyroderces sp.

Thrips hawaiiensis

Introduction of *Elaeidobius kamerunicus* to Malaysia

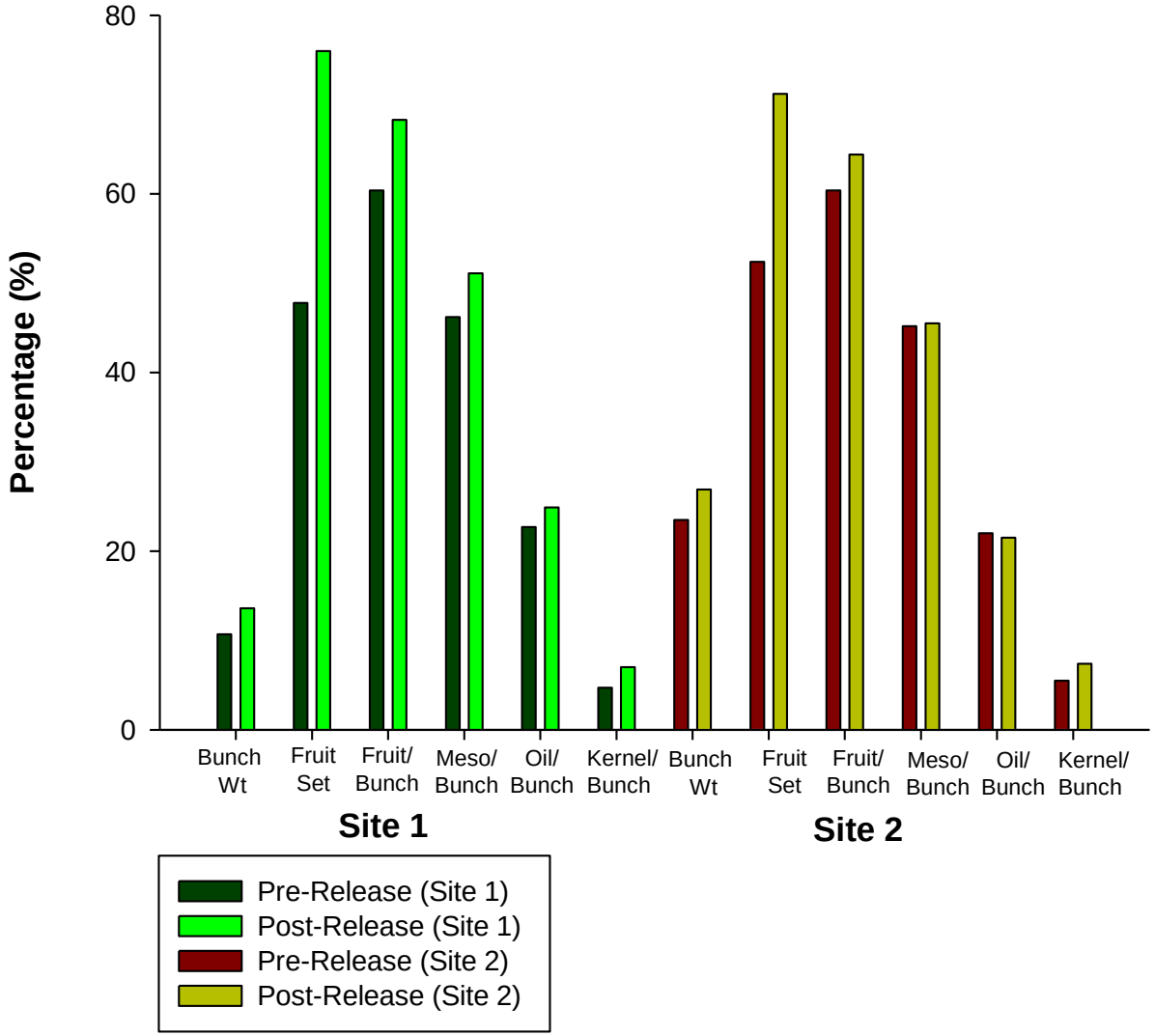


IMPACT OF *E. kamerunicus* INTRODUCTION IN MALAYSIA

Bunch component	Pamol Estate, KluangSite 1 (%)	Mamor EstateSite 2 (%)
Mean bunch weight (kg)	15	27
Fruit set (%)	36	59
Fruit / bunch (%)	7	13
Mesocarp/ bunch (%)	-1	11
Oil/ Bunch (%)	36	10
Kernel/ Bunch (%)	-6	47

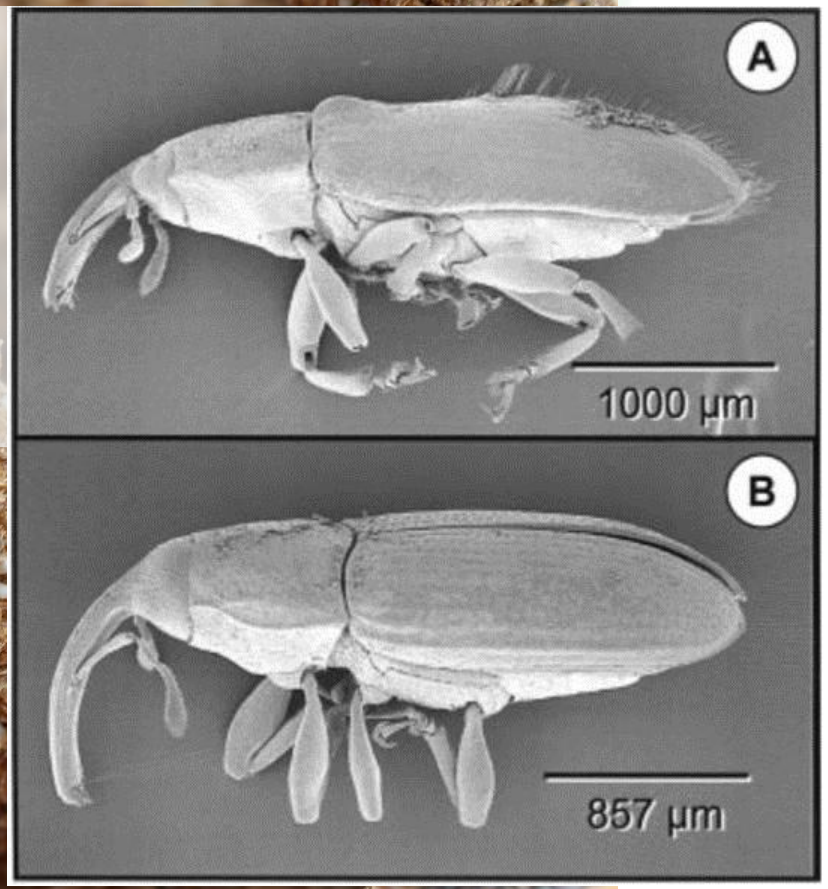
*Percentage of difference

Bunch Composition Before & After *E. kamerunicus* Introduction in Two Sites in Malaysia (Syed, 1982)

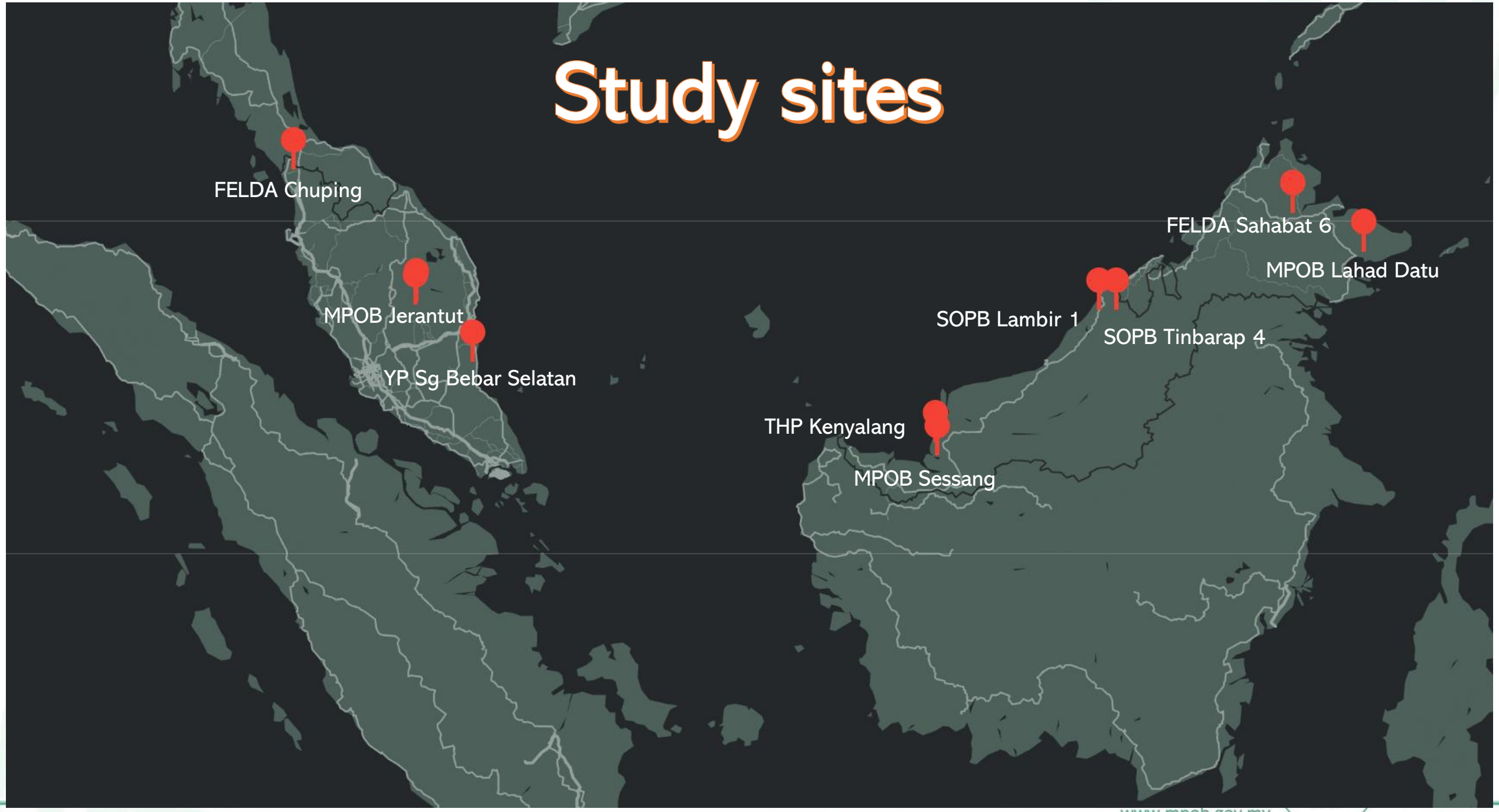


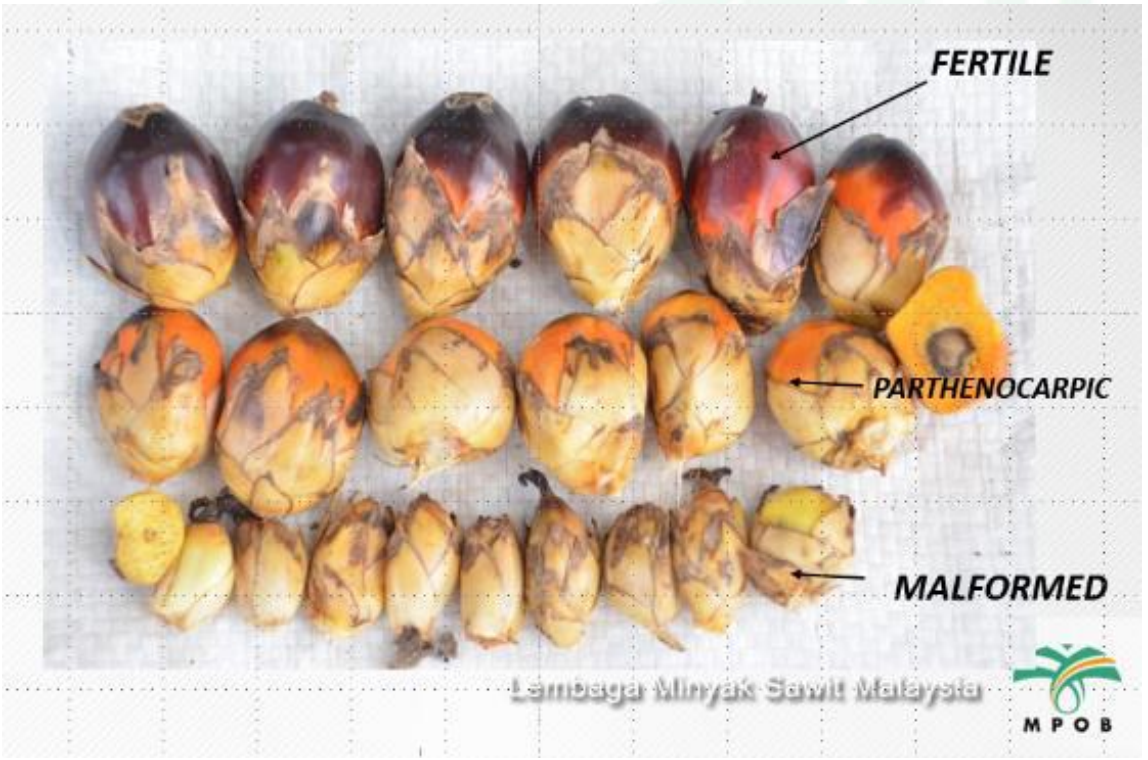
Elaiedobius kamerunicus (Oil palm pollinating weevil)

- A: Male weevil
- B: Female weevil
- Male: Longer body length, wider body width
- Female: Longer snout, male has stouter snout
- Male: Presence of hairy setae in elytral region

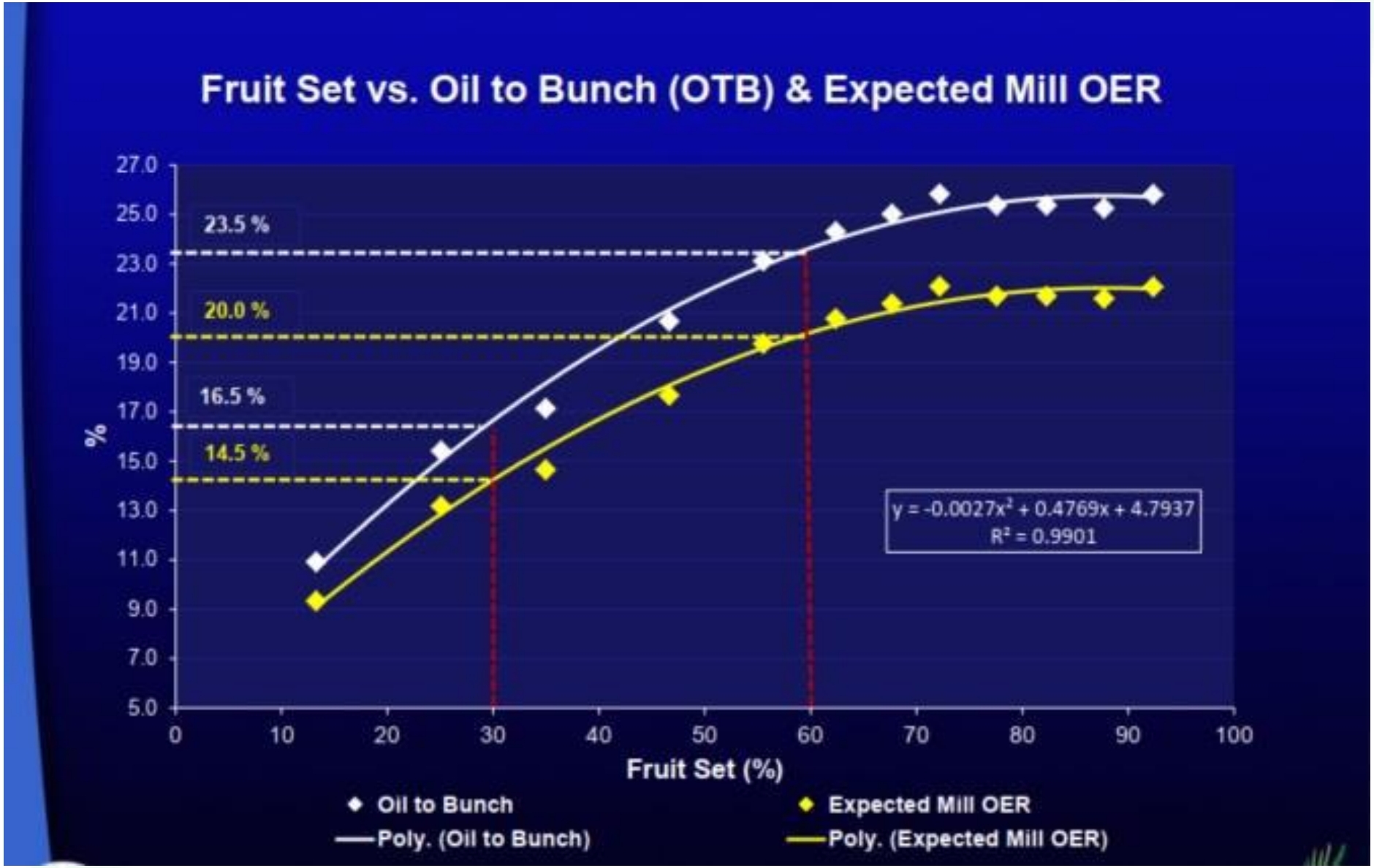


Study sites


FELDA Chuping
MPOB Jerantut
YP Sg Bebar Selatan
THP Kenyalang
MPOB Sessang
SOPB Lambir 1
SOPB Tinbarap 4
FELDA Sahabat 6
MPOB Lahad Datu



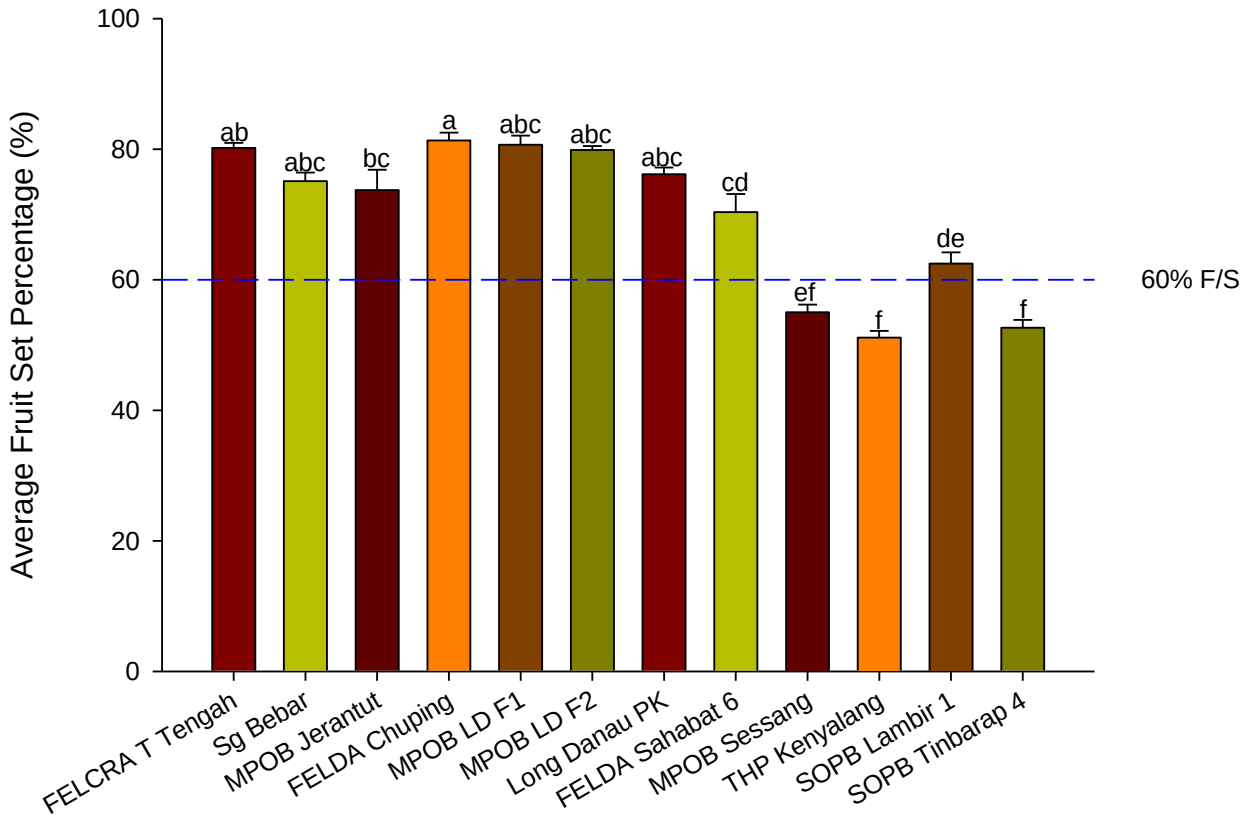
Monthly evaluation of the fruit set at each study site

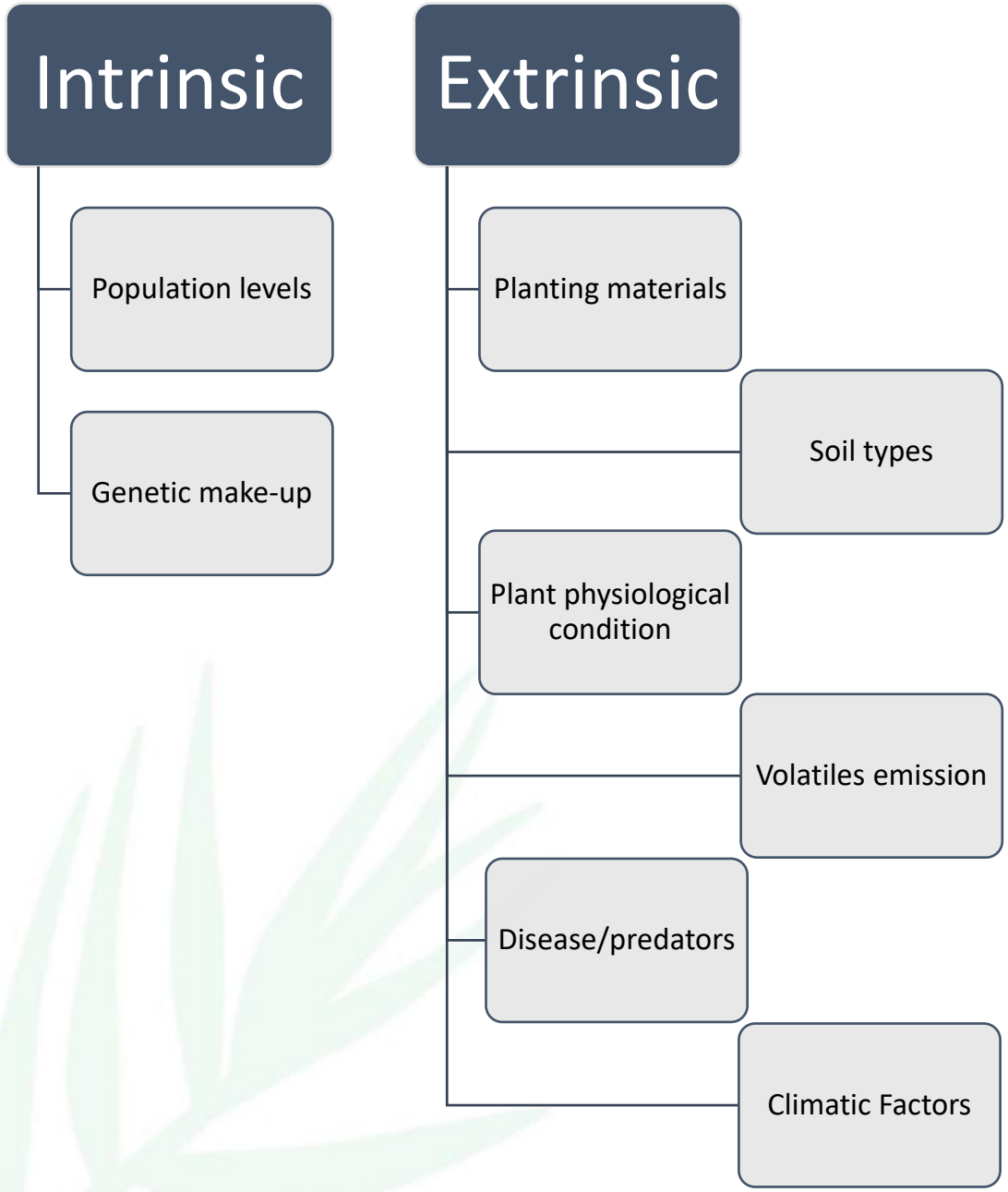


60% fruit set gave optimum oil to bunch % (Othman *et al.*, 2019)

The status of Pollination Efficiency of *E. kamerunicus*

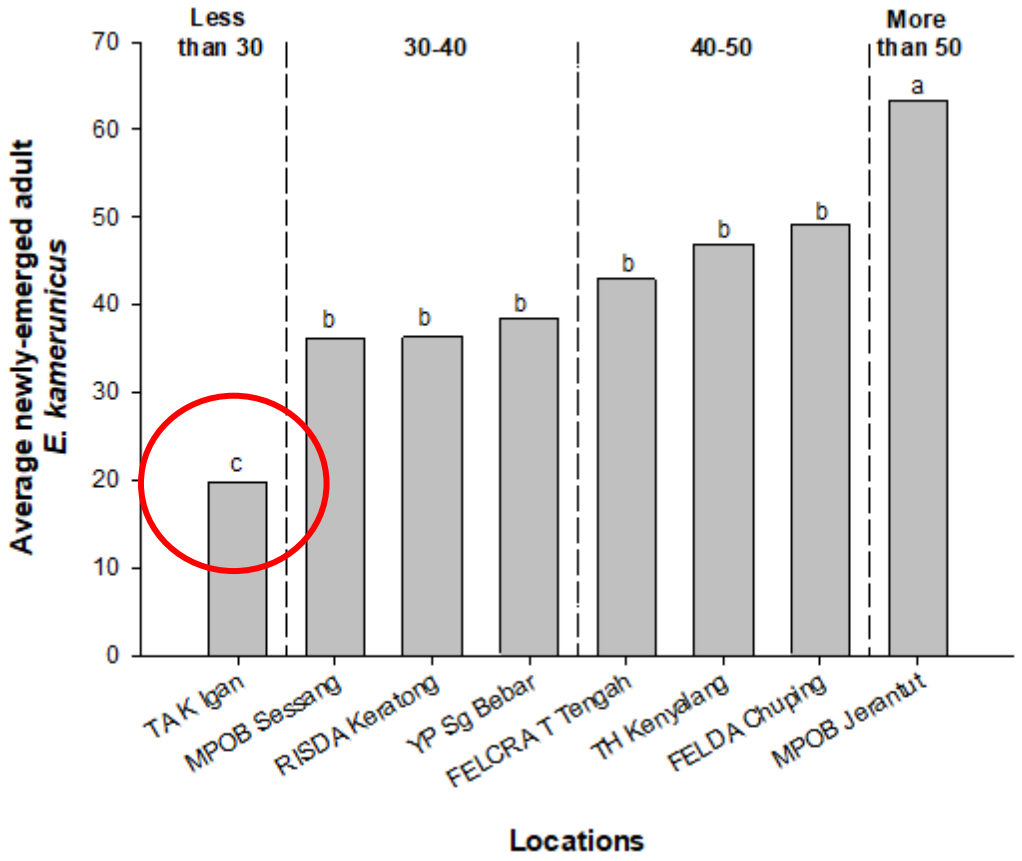
- Fruit set percentage at FELDA Chuping (81.32%) was significantly higher.
- Three study locations recorded a significantly low fruit set percentage compared to the other study sites
- Average of 55.03%, 52.65%, and 51.14%, respectively





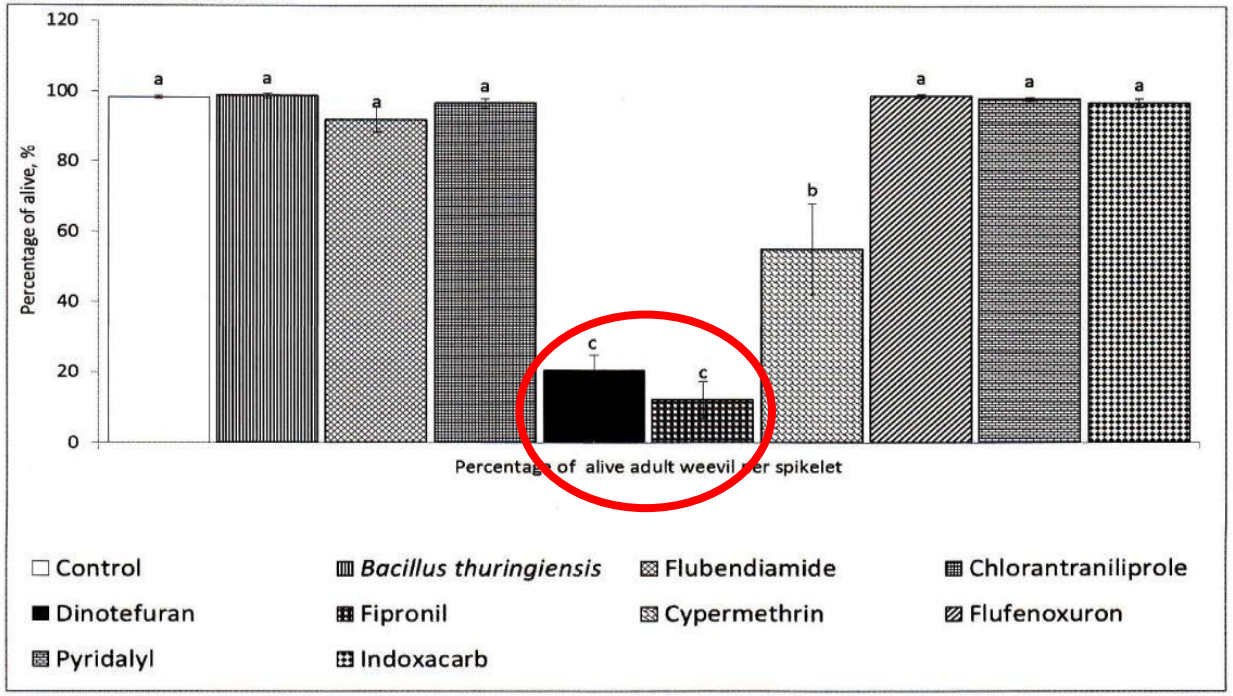
Factors influencing the pollination rate of oil palm

Emergence of new adult *E. kamerunicus*

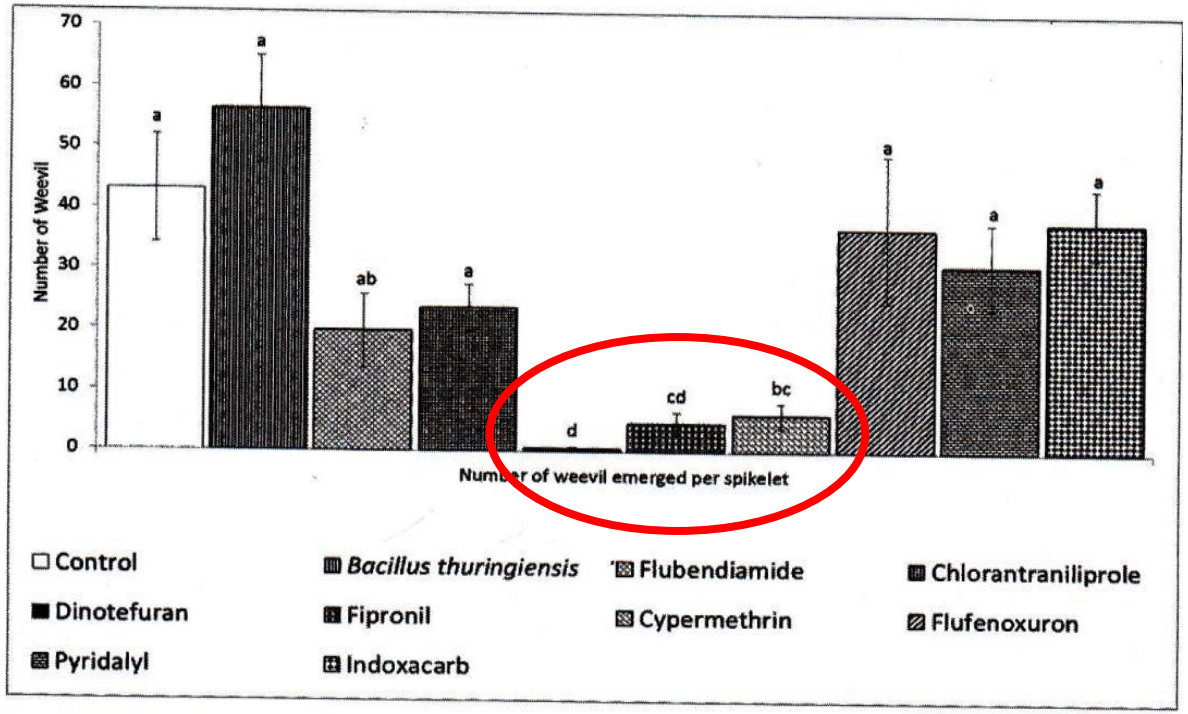


- The average rate of emergence can be classed into four (4) categories; less than 30 individuals; 30-40 individuals; 40-50 individuals, and more than 50 individuals.
- MPOB Jerantut has a significantly higher average rate of *E. kamerunicus* emergence, at 63.28 individuals
- TA Kuala Igan Estate recorded a significantly lowest average emergence rate, with an average of 19.85 individuals
  - Due to inconsiderate use of broad-spectrum insecticide to control *Tirathaba*.

Effect of Insecticides on the Weevil

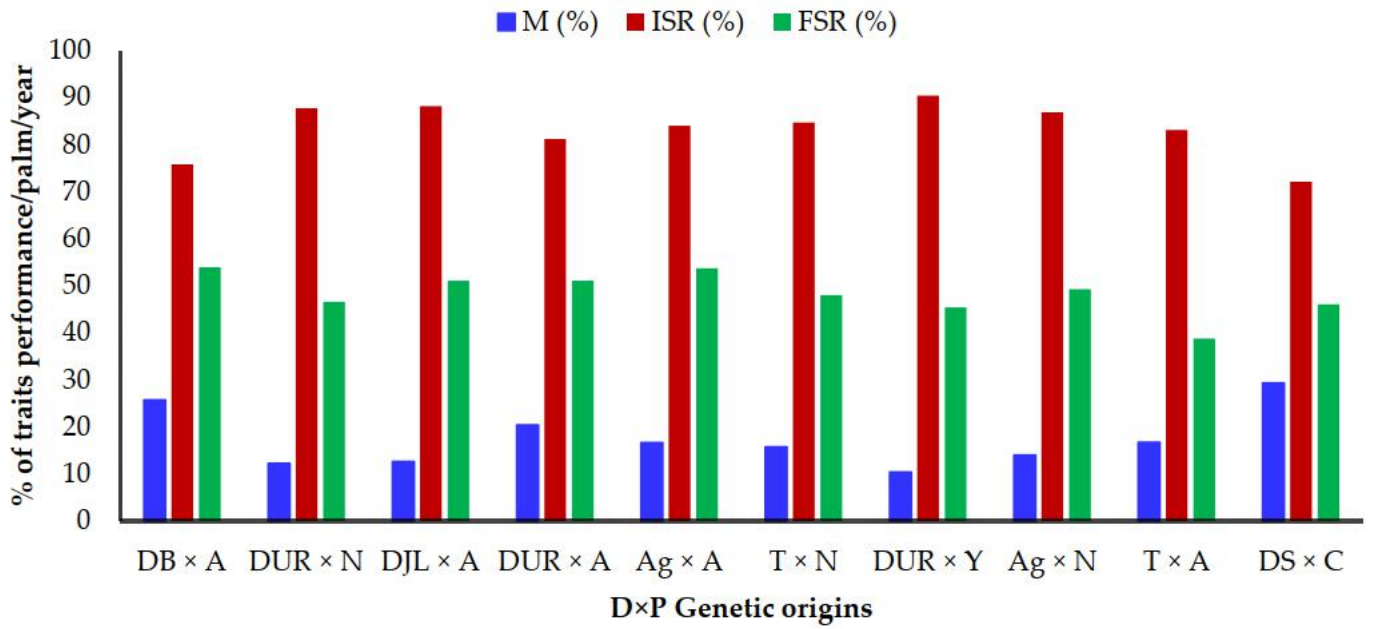


Mean number of newly emerged adult weevil per males inflorescence spikelets at 30 days after treatment (Su *et al*, 2017)



Mean number of adult weevil survived per males inflorescence spikelets 1 day after treatment. (Su *et al*, 2017)

Inflorescence sex ratio and fruit set percentage (Swaray *et al.*, 2021)

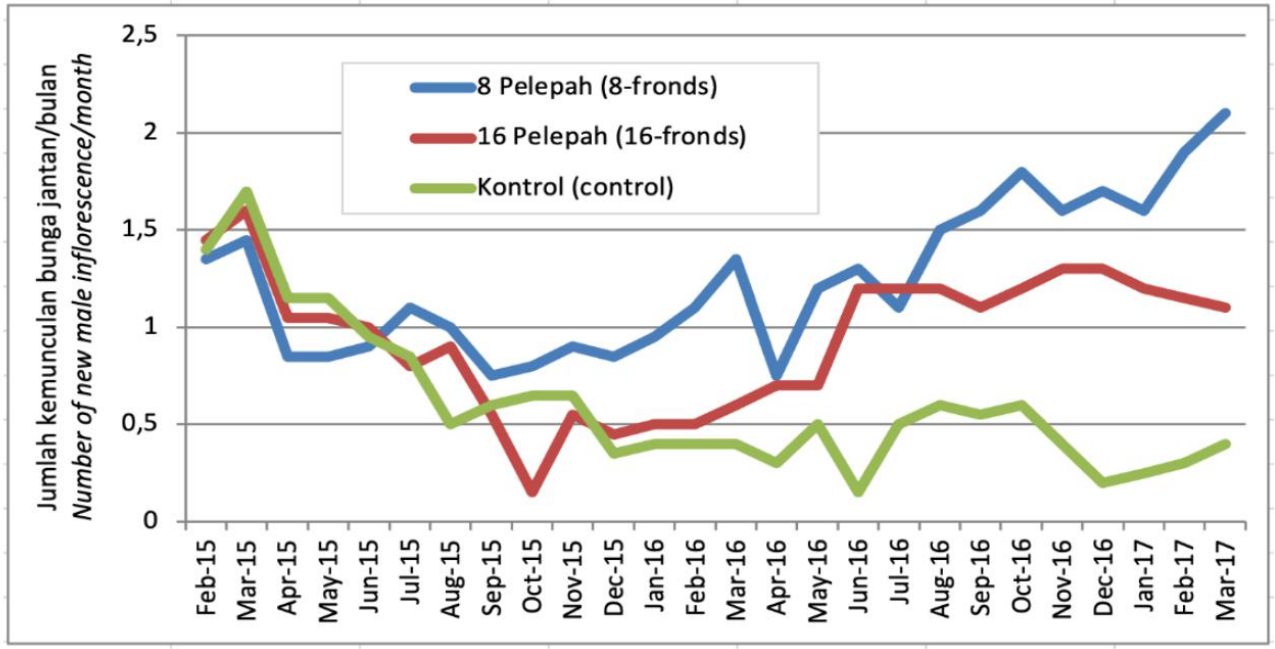


- Infl. Sex Ratio
- Fruit Set %
- Male Infl. %

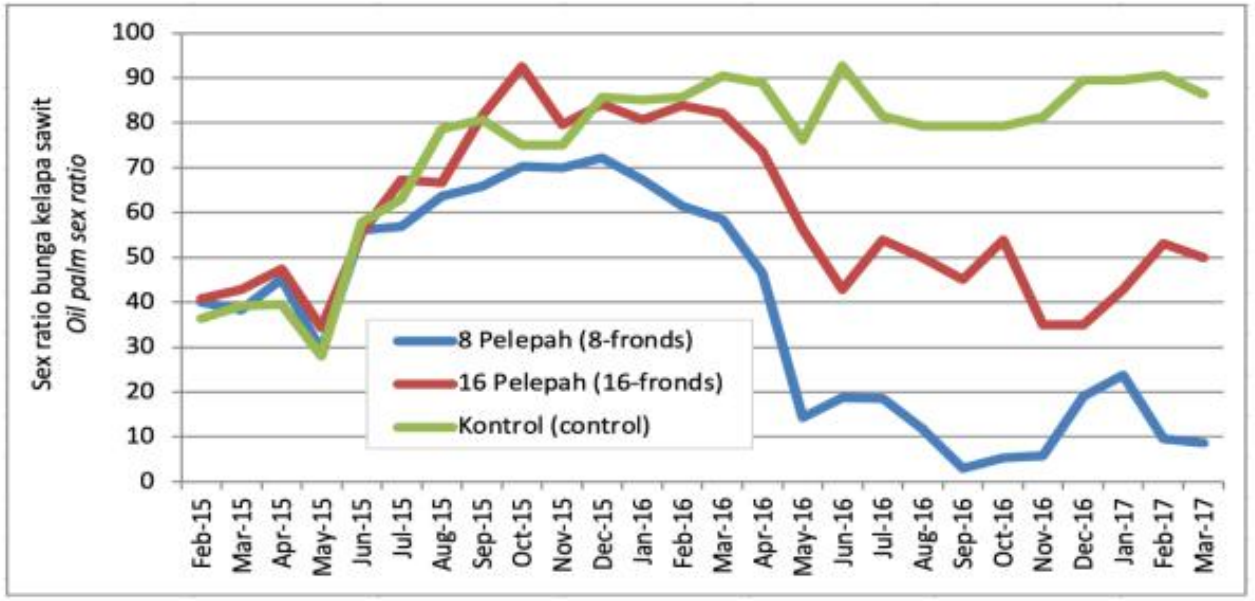
- The data showing the relation of the inflorescence sex ratio with the resulting fruit set formation
- Best inflorescence sex ratio in the range of 72%
- High sex ratio lead to poor fruit set

Addressing the high inflorescence sex ratio

1. Overpruning
   - Aim to increase the number of male inflorescences
   - Effects observed after 11 months (Prasetyo et al., 2021)
   - Increased no. of male inflo with increased no. of fronds pruned.
   - However, the inflorescences produced are smaller & reduced pollen production



Monthly average no. of male inflorescences/palm on overpruned palms vs control. (Prasetyo et al., 2021)



Monthly average ISR on overpruned palms vs control. (Prasetyo et al., 2021)

2. High sex ratio planting materials

- 3 year monitoring
- P379 identified as prospective male-dominant clone
- A palm can produce 12.2 male inflo produced/year compared to average clones (7.8 male inflo/palm/year)
- The oil yield is also higher (49.5kg/palm/year) than average DxP (46kg/palm/year)
- Incorporation of P379 to reduce poor fruit set formation is still being conducted

CONCLUSION

- Poor fruit setting may be induced by different causal factors
- Major contributing factors: Extremely high sex ratio contributed by different planting materials and weather patterns in Sarawak
  - Triggers the issues of low male inflorescences, pollen availability and resources available for the weevils

TAKE-HOME MESSAGE

1. Weevil population contributed **partially** to the success of the pollination
2. Threshold of minimum weevil requirement to ensure satisfactory FS% needs to be revised.
3. Sufficient density of male inflorescences in the field is fundamental to be ascertained before looking into other factors. The suitable **inflorescence sex ratio % should be around 75% - 85%**.
4. Combination of chemical insecticide usage and biological control agents (e.g. *Bacillus thuringiensis*) to control lepidopteran pests in the field is recommended

Thank you…

Terima kasih…

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