

# THE EFFECT OF POLEN

*by* Retno Widowati

---

**Submission date:** 03-Sep-2021 08:56AM (UTC+0700)

**Submission ID:** 1640449249

**File name:** ollensubstitutesontheproductivityofApiscerana\_BeeWorld\_Page1.pdf (723.19K)

**Word count:** 209

**Character count:** 1244

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/271195664>

# The Effect of Pollen Substitutes on the Productivity of *Apis cerana* in Indonesia

Article in *Bee World* · January 2013

DOI: 10.1080/0005772X.2013.11417550

CITATION

1

READS

226

5 authors, including:



**Retno Widowati**

Universitas Nasional, Indonesia, Jakarta

27 PUBLICATIONS 9 CITATIONS

[SEE PROFILE](#)



**Adi Basukriadi**

University of Indonesia

29 PUBLICATIONS 96 CITATIONS

[SEE PROFILE](#)



**Effionora Anwar**

75 PUBLICATIONS 431 CITATIONS

[SEE PROFILE](#)



**Wellyzar Sjamsuridzal**

University of Indonesia

85 PUBLICATIONS 332 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Organoleptic Characteristics and Chemicals Ilabulo Catfish Fortification [View project](#)



*Gandjariella thermophila* gen. nov., sp. nov., a new member of the family *Pseudonocardiaceae*, isolated from forest soil in a geothermal area [View project](#)

All content following this page was uploaded by [Adi Basukriadi](#) on 21 January 2015.

The user has requested enhancement of the downloaded file.

# The Effect of Pollen Substitutes on the Productivity of *Apis cerana* in Indonesia

Retno Widowati, Adi Basukriadi, Ariyanti Oetari, Effionora Anwar, Wellyzar Sjamsuridzal.

The aims of this study were to examine the preferences and productivity of *A. cerana* colonies when fed on a variety of pollen substitutes.

## Introduction

Beekeeping with *Apis cerana* Fab. has been traditionally adopted and is a part of natural heritage of some communities in West Java, Indonesia. Although *A. cerana* are poor honey yielders, they require low cost management and technology; they are adapted to cope with pests, diseases, and predators (Verma, 1998; Joshi *et al.*, 2002; Pokhrel *et al.*, 2006; Hishashi, 2011), and require no medication (Verma, 1998; Hishashi, 2011). Small scale beekeeping operations benefit from *A. cerana* (Joshi *et al.*, 2002). Substitutes for pollen are necessary during periods of pollen dearth to provide the required nutrients thereby preventing colonies from absconding as well as maintaining healthy and productive colonies (Standifer *et al.*, 1977; De Jong *et al.*, 2009; Saffari *et al.*, 2010). Providing pollen substitute for honey bee colonies also resulted in greater comb building, greater brood rearing, stronger colonies and greater hive storage (Pokhrel *et al.*, 2006).

*Apis cerana* colonies are kept traditionally in the apiary in Bandung, West Java using hives without movable frames. *Apis cerana* build combs parallel to each other. Productivity in *A. cerana* colonies can be measured by counting the number and circumference of the combs before and after experiment. The measurement of combs could only be done at night, in order not to interfere with the activities of the honeybees.

Pollen substitute is a protein rich mixture of honeybee diets with no added pollen. The most popular formula for a substitute is soy flour, dry brewers' yeast and dry



Fig. 1. Map of Indonesia, Java, and the location of apiary in Bandung, West Java.

Akratanatul, 1990; Somerville, 2000; Prakash *et al.*, 2007; Brodschneider and Crailsheim, 2010) with honey or sugar syrup added to form it into pellets or patties (Akratanatul, 1990). Yeast in pollen substitute provides vitamin B complex (Somerville, 2005) and yeast protein levels are around 50% (Somerville, 2000; Somerville, 2005). Yeast plays an important role in honeybee nutrition. Gilliam (1979) reported that yeast associated with honeybees could provide enzymes, amino acids, vitamins, and minerals to change pollen to bee bread biochemically.

Sjamsuridzal *et al.* (2010) isolated yeasts associated with *A. cerana* in West Java. A yeast was identified as *Candida hawaiiiana*, CR 015, from the stamens of kecubung gunung (*Brugmansia suaveolens*) flowers visited by *A. cerana* worker bees. As yet there is no report on the use of local yeast isolated from honey bees for pollen substitute. All this time brewers' yeast or bakers' yeast was widely used in pollen

## Materials and Methods

The basic ingredients of the pollen substitute were soy flour (hexane extracted and vacuum heated afterwards), skimmed milk powder and yeast. The yeast *C. hawaiiiana* CR015 was deposited in the University of Indonesia Culture Collection (UICC). Yeast cells on Yeast-Extract Malt-Extract Agar (YMA) inoculated in to Yeast-Extract Malt-Extract Broth (YMB) prepared for production of biomass. Lyophilisation technique was used for dry yeast biomass. A brand of bakers' yeast containing *Saccharomyces cerevisiae* was used as commercial yeast for comparative purposes in pollen substitute. To make pollen substitute patties *A. cerana* honey from the apiary, water or sugar syrup 50% (w/v) were added. Four local pollen substitutes i.e. PS-A, PS-B, PS-C, PS-D and an imported pollen substitute (PS-E) were prepared for the honeybee colonies and the ingredients are presented in Table 1. The nutritional values of pollen substitutes powder i.e. protein, carbohydrate, fat, and ash were analyzed. The

# THE EFFECT OF POLEN

---

## ORIGINALITY REPORT

---

6%

SIMILARITY INDEX

6%

INTERNET SOURCES

5%

PUBLICATIONS

0%

STUDENT PAPERS

---

## MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

---

6%

★ [sinta.ristekbrin.go.id](http://sinta.ristekbrin.go.id)

Internet Source

---

Exclude quotes      On

Exclude matches      Off

Exclude bibliography      On