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Foraging efficiency of APIs spp. in Syzygium cumini (Myrtaceae)

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ABSTRACT

The foraging behavior of honey bees (Apis spp.) on blackberry (Syzgium cumini) was studied in Bengaluru. During fully flower blooming period of March to April in 2019 and 2020. twenty days in each period of the year. It was noticed that honey bee intensely and preferably forage pollen first and then nectar almost thought the day from 6 am to 6 pm with a peak between 9 am to 11 am. And noticed that percentage of foraging Apis florea (51.18%), Apis dorsata(19.75%), Apis mellifera(14.76%), and Apis cerana(14.31%). Apis florea spent more time to forage per flower and at least one is Apis dorsata than the other.

Keywords: *APIs Cerana, APIs Dorsata, APIs Florea, APIs Mellifera, Foraging Behaviour, Pollination, Syzgium Cumini*

1. INTRODUCTION

Honey bees are belonging to genus *Apis*. Family Apidae and Order Hymenoptera. The genus *Apis* consisting of nine recognised species are *Apis dorsata, Apis cerana, Apis florea, Apis mellifera, Apis laboriosa, Apis andreniformis, Apis koschevnikovi, Apis nulensis* and *Apis nigrocincta*. Honey bees are the important pollinator in an ecosystem and directly contribute maintenance of biodiversity. The main group of insect pollinators are ants, wasps, butter flies, beetles, moths, and flies. Honey bees (Hymenopterans) are most abundant insect pollinator (Mattu 2015). The frequency of insect visitors for a flowers are very less comparing to honey bees.70% of the crop plants and some flowering plants are pollinated by hymenopterans especially bees among all the pollinators (Balachandra 2014) one third of human diet derived from bee pollinated products. At the time of 8am to 10 am large number of foraging bees left the colony (Alqarni 2006), Foraging activity of working honey bees started at 6.17am and it can be varying by the region (Joshi & Joshi 2010). Indian rock bee *Apis dorsata* foraging activity is more during morning hours compared to afternoon hours (Behera 2018) it can be altered by some external factors in a day. Foraging activity is optimal at 16^0C to 30^0 C above 30^0 C reduces foraging activity and increases the collection of water (Ministry of Agriculture 2015).

In Bengaluru *syzgium cumini* is frequently observed in road sides, gardens and parks. It is commonly referred as black berry (Nerale) belongs to Myrtaceae family. It is a woody tree ranges from 30-90 feet height can live more than 100yrs this tree is favoured for its berry fruit, timber and ornamental value. The inflorescence of *syzgium cumini* bears a clusters of flowers blooming in summer season the flowers are nearly yellowish white in colour with full of nectar and pollen. The main objective of my study was to investigate foraging efficiency of *Apis* spp. In black berry and assessing the apiculture value of this plant.

2. MATERIALS AND METHOD

The study is carried out in Bengaluru $12^0\,59^1$ N, $77^0 35^1$E south India region. during the month of March and April 2019 to 2020 before study examine the number of feral colonies of *Apis* spp around the study site by transect method in $1km^2$ (Abdullahi 2011), all the *Apis* spp were observed as they foraged on Syzgium *cumini* flowers and their activities were they noticed during the flowering period 27 days of *Syzgium cumini*. The observations were recorded at on hour interval,10 min for each spp in each transect of $1m^2$. Stop watch is used for recording the time, visiting pollinators are collecting by sweep net for identification, after identification collected bees were released. Recorded the temperature clear in sunny days. The number of *Apis* spp. Visiting to the flowers were counted for ten min. sampling was made at ten min interval during different times of the day from morning 6am to evening 6pm.

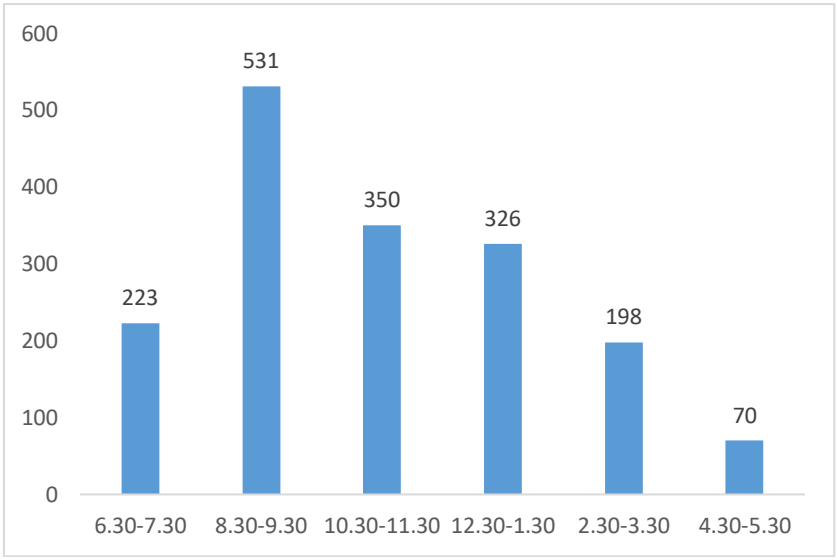
3. RESULTS AND DISCUSSION

3.1 Floral description

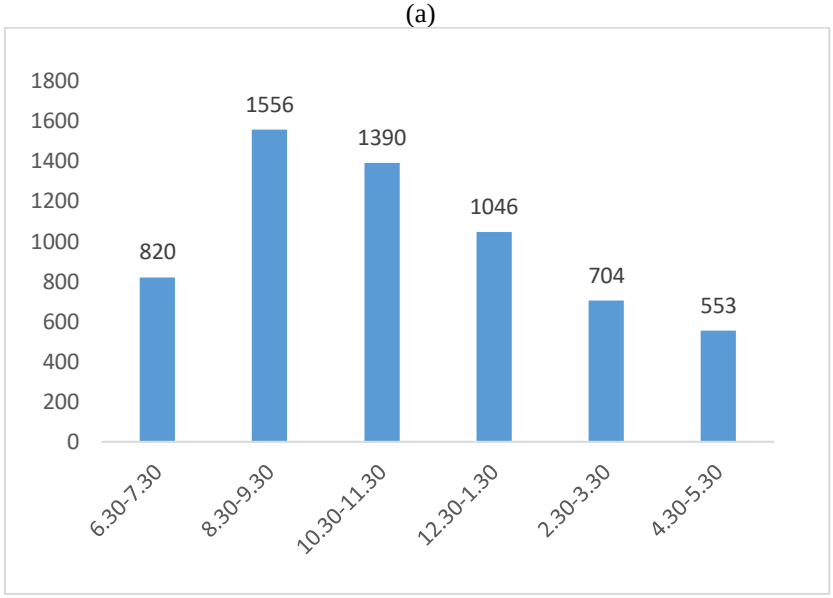
The flowering period of the plant *syzgium cumini* occurred during 10^{th} March to April 5^{th} (27days) in Bengaluru. *Syzgium cumini* produces small bisexual flowers with cream fragrance, which remain opens from morning to till evening, the flowers are in clusters with white in colour, indefinite stamens, filiform filament and versatile anthers with white pollen.

3.2 Foraging Preference

Among four species of *Apis* species were frequently visited to *Syzgium cumini* flowers typically foraged nectar and pollen by crawling around the base of the flower. During flowering period(27days) in 2019 to 2020. Total out of 11858 visits i.e *Apis florea* (6069), Apis *dorsata* (2342), *Apis mellifera* (1749) and *Apis cerana* (1698). the maximum foraging activity was observed during 8.30am to 9.30am at 23^0C and lest 4.30pm to5.30pm at 28^0C.



(a)



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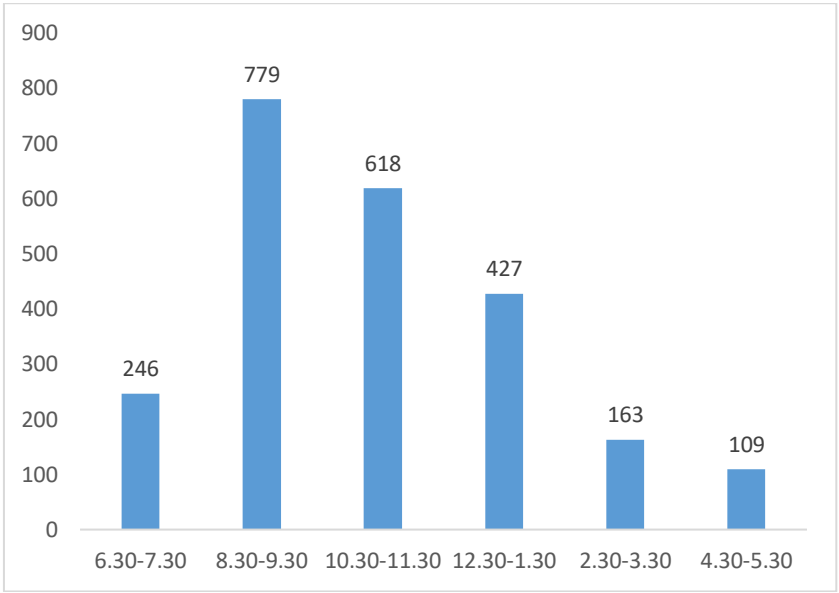

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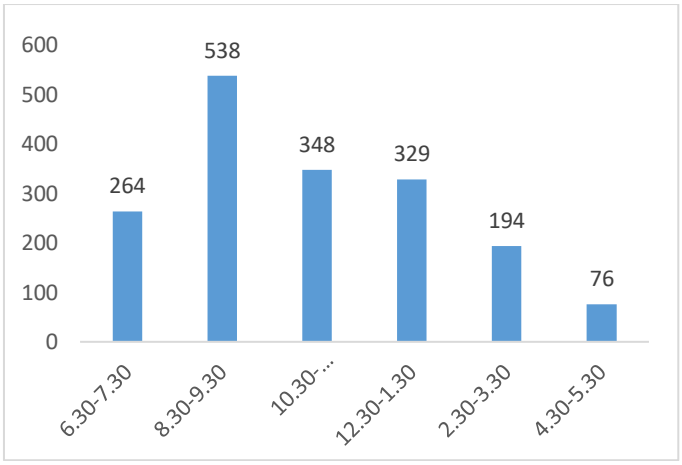
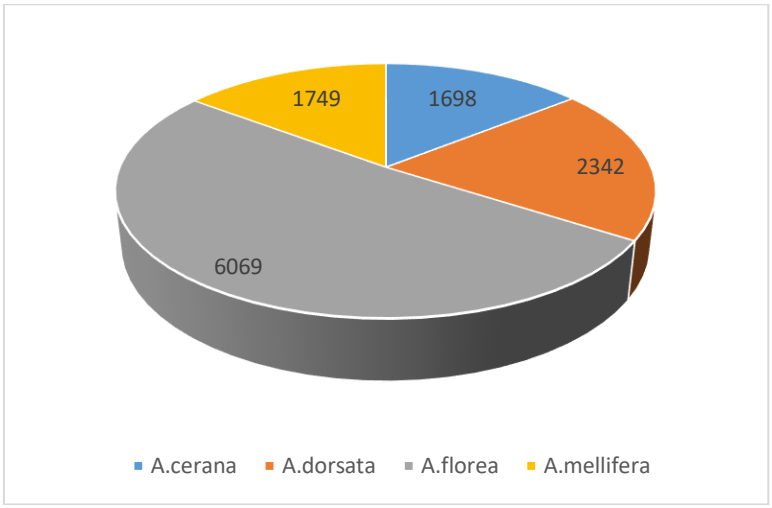


(d)

Fig. 1: Daily Distribution of (a) *A.cerana*, b) *A.dorsata* c) *A.florea*, d) *A.mellifera* on *Syzgium cumini* inflorescences over 28 days.



(2)

Fig. 2: Daily Distribution of apis spp on Syzgium cumini inflorecences over 28 days.

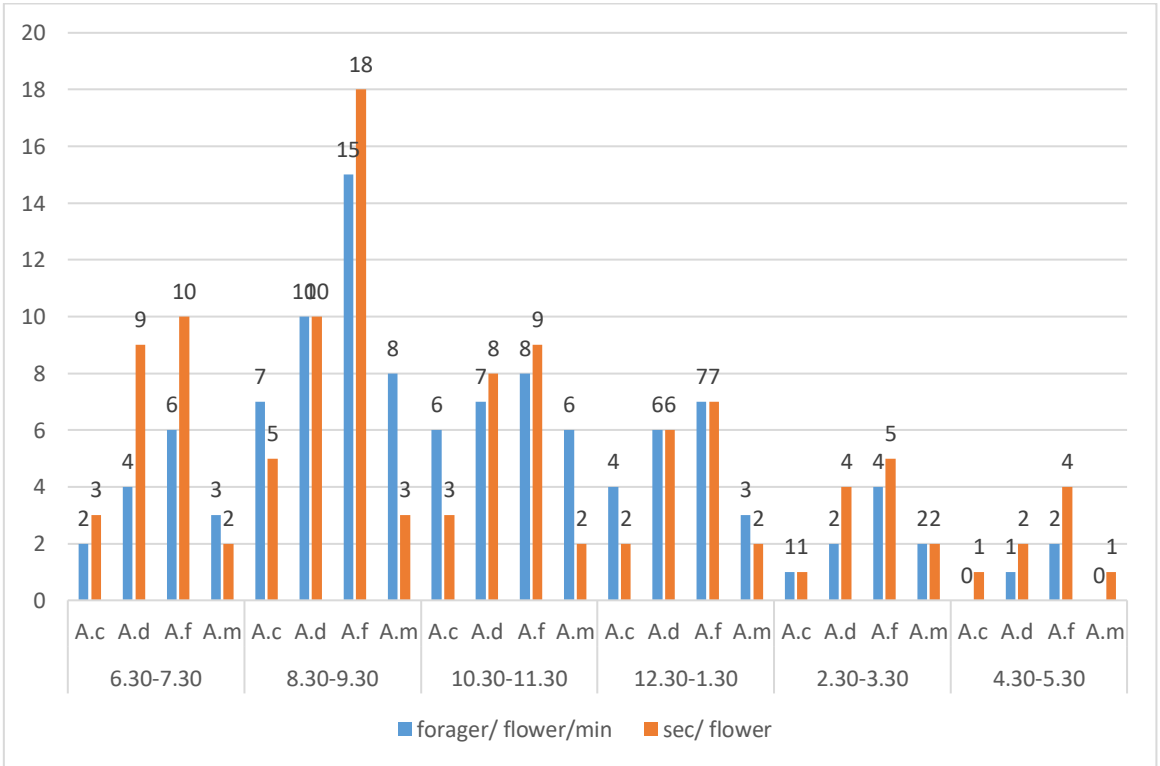


Fig. 3: Foraging activity of *Apis* Species in daily time period

4. DISCUSSION

In this study indicated that *A.florea* was more regular floral visitor among *A.dorsata, A.cerana* and *A.florea* pollination during flowering period of *Syzgium cumini. A.florea* workers were highly attracted to and intensely foraged pollen and nectar of flowers. Number of forager on *Syzgium cumini* flowers were recorded in the morning at 23^0C and lowest during in the evening hours with at 28^0C during entire flowering period (28 days). Among all *Apis* spp spend different time per flower of *Syzgium cumini* and varies significantly from 6.30am to 5.30pm. Foraging activity all *Apis* spp is maximum at 8.30am to 9.30am (fig,1).and also examined the foraging activity of *Apis dorsata* is peak at morning hours (Arun 2017). The number of feral colonies of *A.cerana*(1), *A.dorsata*(2), *A.Florea*(4) and *A.mellifera*(1) were recorded within the $1km^2$ transect of study site.

Visitors are more during when the most flowers are opened, The Flowering period of *Syzium cumini*. The number of visitors per flower varies significantly from morning to evening (Fig.3). *A. florea* workers visits more (7.33) flower per minute and spend more time in a flower *A.florea*(8.83sec) then followed by *A.dorsata*(6.65sec), *A.cerana*(2.5sec) A.mellifera(2.17sec). The visitors of worker bees per flowers is depends upon the presence of high nectar and pollen attraction in *Syzgium cumini* and availability of blooming plants and temperature. The density of visitors per flower increases the competition between worker bees and other pollinating insects for their food source.

5. CONCLUSION

In conclusion, the foraging activity was recorded in *Syzgium cumini* during 2019 to 2020 (28 days) of flower blooming period. the results revealed *A.florea* is the Predominant and most efficient pollinator in *Syzgium cumini* among other *Apis spp i,e. A.dorsata, A.cerana, A.mellifera*. *Syzgium cumini* flowers are having a nectar at base of the style which attracts pollinating insects including honeybees. Foraging activity and foragers visiting is peak during morning hours i,e. 8.30 to 9.30.

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