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OBSERVATION OF BEE WEIGHT DURING FAVOURABLE AND UNFAVOURABLE SEASONS

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INTRODUCTION

Utilization of *A. Cerana* for Indian Beekeeping

India and the neighbouring east Asian region is considered to be the centre of origin and evolution of honey bee species, all the spices of honey bees have been used in the country from time immemorial for collection of honey and bees wax. Being one of these indigenous bees, ancient Indian came across *Apis Cerana* as a miller bee that could render itself to manipulation by them.

The bee hives were made with loanly available (or) using wall spaces in the dwellings.

The design of the hives was very simple and considered only volume of the bee cluster. There were to input in the form of sugar feeding comb foundation and chemicals (verma(1989) and verma and pradhap (1993) list the following advantages of bee keeping with A. Cerana, compared to that with ectic.

A. Cerna is gentle to handle, industrious and well adopted to the ecological condition south and south east asia.

Chemicals are not required in beekeeping with *A. Cerna* to control diseases, parasites and predators, unlike in beekeeping with *A. mellifera*

The variety of geographical races/ population of *A. Cerana* that exists in south and south – east Asia provide excellent opportunities for the genetic improvement of this native species.

Through genetic engineering techniques, it may be possible to introduce desirable genes from *A. Cerana* and *A. mellifera*

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Ap. cerana is sympatic in distribution & can co - exist with he 2 other sp of Asiatic honey bee, A. dorsata, A. florea, without any adverse ecological consequences. *Ap. Cerana* begins foraging activities earlier morning and at lower temperature than *A. mellifera*. The foraging activities of *Ap. Cerana* for replace at temperature from 3-5 degrees centigrade lower than those known to initiate foraging activities in *A. mellifera*. Thus *A. Cerana* could be used for crops in early spring and at latitudes at least as far north (or) south those where A. mellifera are used beekeeping with *A. Cerana* is a traditional occupation and forms an integral part of social and cultural heritage of rural and tribal communities of country. Shihagl (1995) listed following specific advantages of utilizing the indigenous A. Cerana in pollination of several tropical and sub-tropical crops because it is a better (or) more easily managed pollinator having superior attributes. Colonies of A. Cerana are smaller than those of *A. mellifera*, which facilitates their easy handling forgers of *A. Cerana* have shorter foraging range than those of *A. mellifera* and therefore a visit the target crop with reliability.

The number of pollen foragers shows maximum variation during different times of the day and on different days of the year compared to that of nectar foragers and of non-foragers Reddy and Bai, (1979), Reddy (1979) found in Bangalore, Karnataka, that the preparation of pollen foragers, the pollen stores in the hive and the amount of brood reared followed a similar pattern. Relative humidity and rainfall showed a significant positive relationship with pollen gathering activity, but not with nectar gathering activity. Temperature and wind speed did not affect the foraging activity. Pollen gathering activity, but not nectar foraging, increased on the day of solar exlipse mainly in populous colonies (Diwan,1980).

The Indian bee is an efficient forager. It carries pollen lead ranging from 2 to 190 mg in weight (Cherian et al., 1946, Punjabi et al., 1969, Dhaliwal, 1970., Naim and Bisht,1979, Rahman and Rahman 1993). They carry 27 to 35 % of their body weight as pollen load (Cherian et al., 1946, Anonymous,1951, Punjabi et al., 1969). The ratios of the load to body weight is higher in Apis cerana then in A. mellifera. The southern and northern hill types carry heavier load Punjabi et al., 1969). During active brood rearing season (june & September) in the south Indian agricultural plains an average of 654 foragers brought in pollen daily, totalling 5.69 (Ramachandran and Mahadevan,1950, Subbiah,1956). The volume of nectar solution sololy depends upon the capacity of the honey stomach, and does not depend upon the concentration of sugars in the nectar. Bees carry 64 per cent of their body weight as nectar load, and bees with bigger body size and weight carry larger loads(singh,1971)

MATERIALS AND METHODS

The study was carried in a small apiary maintained at the entomology Department, Annamalai university.

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7 colonies of *Apis Cerana indica* kept in newton bee hives were taken for the study.

Observations were recorded daily during morning and evening hours.

Foraging efficiency of a colony was measured in terms of number of bees with pollen load entering the hive. The floral sources present near the colonies in which bees reached for pollen collection were observed. Honey bees play a vital role the pollination. The foraging behaviour of worker bees such as weather distance of food source from the hive, food quality, quantity of nectar and pollen. There is usually shortage of floral resources during summer and rainy seasons., i.c., from june to August (Mishra and Sharma, 1997). Bees generally forage to a food source within 3 km radius.

Feeding during pollen dearths:- various substances and formulates for pollen substitutes (Bhupen,1943) and pollen supplements have been tried as feeds. Bee keepers in hills of uttar Pradesh use wheat pancakes and jaggery (raw sugar).

Similarly substitutes like pea flour, gram flour, soya bean flour and skimmed milk powder have been used. Excepting the last two, all are not useful as pollen substitutes. In the south Indian agriculture plains bee colonies consumed very small quantities of pollen substitutes made of varying proportions of soybean flour and yeast mixed with jiggery or sugar, and showed least preference for fried ground nut kernal and yeast mixed with jaggery/sugar. Consumption of these pollen substitutes had no effect on brood rearing (Subbiah,1956).

Feeding during nectar dearth:- cane sugar has been generally found to be good for preparing syrup and feeding to the bee colonies during nectar dearth. Sugar syrup feeding is given normally in the proportion of 1:1, sugar : water as a stimulative feeding, brood rearing and for comb building. During summer a 1:2 syrup is given, whole in winter upto 2:1 syrup is given. Lower concentrations of sugar are used in preparing syrups given as stimulative feeding at the beginning of active brood rearing season. Syrups with 2 parts of sugar and 1 part of water are fed during dearth periods, particularly during winter seasons. Sugar feeding should be provided in large quantities, 2-3 times in the dearth season, rather than small quantities each day. In the latter case artificial feeding encourages robbing behaviour to the detriments of weak colonies (singh,1943b).

Feeding sugar syrup fortified with 0.75 per cent of vitamin c, improved foraging activity, comb building, brood rearing and defence behaviour (Verma and phogat,1982). Singh and verma (1983) found that weak colonies recovered, build more comb and reared more brood when fed with sugar syrup containing antibiotics than when fed with simple sugar syrup and enteromycin 250 mg in the same proportion, were tried and colonies fed with the former grew better and reared more brood than those fed with the latter. Feeding sugar syrup made with water having

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soil extract improved pollen collection at Bangalore, Karnataka (Raj and Basavanna, 1983). All these experiments were of preliminary nature and needed further confirmation.

Colony multiplication can be undertaken only during periods of abundant availability of nectar and pollen, so that the colonies grow in strength. Availability of forage is also necessary for at least a month after the nectar are formed so that the colonies have sufficient time to establish. The farming and orchard (or) plantation areas in the country offer these conditions of forage availability continuously for over two months. The proportion of colonies to nectar that can be produced in any colony multiplication programme depends upon the forage availability.

A large number of colonies are scrutinized, during periodic in sections, for over twenty qualitative and quantitative characters and individual colony records are maintained. At the end of the annual colony growth cycle, individual colony records are maintained. At the end of the annual colony growth cycle individual colony records are scrutinised and colonies that show a maximum combination of desirable qualitative characters are selected. The number of such selections does not exceed 10 per cent for the experimental colonies kept under observations.

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Weight of Honey bee at various seasons for the year 2018

Date	Temp		RH %	Rainfall mm	Sun Shine	Wind Velocity Kmph	Queen Honey Bee Weight In mg.			Drone Bee Weight in g.	Worker Bee Weight in g.
Jan 1st week	28.7	21.3	87	000.0	07.6	02.2	0.96	0.95	0.62	0.25	+/- 0.2
Jan 2nd Week	27.9	23.0	92	055.6	04.5	01.8					
Jan 3rd Week	28.9	21.9	88	000.0	08.5	02.3					
Jan 4th Week	28.8	20.7	85	000.0	09.1	03.1					
Feb 1st Week	28.8	20.5	89	000.0	08.5	02.8	0.98	0.95	0.61	0.3	+/- 0.2
Feb2nd Week	29.1	20.4	86	000.0	09.2	02.5					
Feb 3rd week	27.8	21.5	87	000.0	08.1	02.3					
Feb 4th Week	29.9	22.6	88	000.0	07.4	02.1					
March 1st Week	32.0	26.7	89	000.0	08.4	01.9	0.97	0.93	0.61	0.2	+/- 0.2
March	33.2	22.8	88	000.0	09.5	01.9					

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2nd week											
March 3rd Week	33.6	23.2	89	000.0	08.9	02.7					
March 4th Week	38.5	23.1	88	000.0	08.3	02.2					
April 1st Week	35.1	24.8	82	000.0	07.5	02.6	0.97	0.92	0.63		+/- 0.2
April 2nd week	35.5	25.8	81	000.0	09.0	04.3					
April 3rd Week	35.7	25.8	81	000.0	08.4	03.6					
April 4th Week	35.9	26.7	80	000.0	07.4	04.0					
May 1st Week	35.6	27.0	80	000.0	08.2	04.1	0.91	0.90	0.90	0.212	+/- 0.2
May 2nd week	36.0	26.6	81	013.2	05.9	04.9					
May 3rd Week	36.5	27.2	78	000.6	06.5	08.6					
May 4th Week	38.9	27.8	75	000.0	09.5	08.1					
June 1st Week	36.2	26.6	79	048.2	04.2	05.6	0.96	0.92	0.9	0.212	+/- 0.2
June 2nd week	34.4	26.0	82	009.6	04.1	06.7					
June 3rd Week	35.6	25.6	83	000.0	07.0	06.4					
June 4th Week	36.2	26.6	78	000.0	07.5	06.8					

July 1st Week	35.2	26.0	80	004.0	04.4	06.8	0.96	0.94	0.73	0.217	0.216
July 2nd week	34.8	25.4	80	031.0	06.4	05.2					
July 3rd Week	34.4	25.2	84	000.0	03.6	04.3					
July 4th Week	34.7	25.8	80	000.0	04.3	06.1					
August1st Week	31.3	25.2	80	023.8	05.3	05.9	0.95	0.94	0.62	0.216	0.215
August2nd week	35.5	25.9	83	013.0	07.4	04.4					
August3rd Week	33.9	27.6	85	053.6	05.2	03.7					
August 4th Week	29.8	24.4	92	064.9	01.3	02.2					
Sept. 1st Week	33.5	24.2	86	045.6	06.0	05.1	0.97	0.93	0.64	0.215	0.214
Sept. 2nd week	33.8	25.4	81	004.8	03.9	05.3					
Sept. 3rd Week	32.6	24.1	88	026.4	03.6	04.7					
Sept. 4th Week	33.3	25.6	83	000.0	06.5	03.0					
Oct. 1st Week	31.4	25.0	87	034.6	04.2	01.6	0.98	0.94	0.63	0.216	0.215
Oct. 2nd week	33.0	24.9	85	032.4	04.3	02.8					
Oct.	33.9	24.7	82	017.8	03.1	04.6					

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3rd Week											
Oct. 4th Week	33.2	25.4	81	000.0	08.3	04.7					
Nov. 1st Week	30.1	23.8	84	018.2	04.8	03.9	0.97	0.94	0.63	0.215	0.214
Nov. 2nd week	29.5	23.4	92	125.0	06.0	02.5					
Nov. 3rd Week	29.9	24.4	81	058.2	04.0	03.6					
Nov. 4th Week	29.0	23.6	80	022.6	01.1	02.4					
Dec. 1st Week	27.0	22.8	87	128.6	00.8	03.1	0.94	0.92	0.62	0.214	0.213
Dec. 2nd week	27.0	22.5	91	006.7	04.4	00.7					
Dec. 3rd Week	30.6	23.5	88	669.2	04.4	03.0					
Dec. 4th Week	27.5	21.3	87	028.8	04.6	02.8					

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OBSERVATION AND DISCUSSION

- In the month of January honey bees shows 0.96 mg wt, 0.62 mg wt (Drone bees) and 0.2 grams of worker bees weight.
- During February month queen bee shows 0.98 mg and 0.30gm (Drones) and +/- 0.218 gm of workers
- In the month of March queen bees shows the weight 0.97mg and 0.2gm of Drones and +/- 0.21 gm of workers.
- In the month of April queen bee shows 0.97 mg and Drone showed 0.2 gm and +/- 0.21 gm of workers.
- In the month of May Queen bee shows 0.91 mg and Drones showed 0.212 gm and +/- 0.2 gm of workers.
- During the month of june 0.96 mg of Queen bee weight, 0.212 gm of Drones and 0.2 gm of workers.
- During the month of july 0.96 mg of queen bees weight and 0.217 gm of drones and 0.216 gm of worker bees weight
- Observation of August month 0.95 mg weight of queens and 0.216 gm of drones and 0.215 gm of workers weight
- In the month of September 0.97 mg weight of queens, 0.215 gm of drones and 0.214 gm of workers respectively.
- During October month 0.98 weight of queen,0.216 gm of drones and 0.215 gm of workers respectively.
- In the month of November 0.97 mg of queen bees, 0.215 gm of drones and 0.214 gm of worker bees respectively.
- Observation at December month 0.94 mg of queen wt and 0.214 gm wt for drones and 0.213 gm of workers bees respectively.

In India, importance of bee keeping is for honey production and a little importance has till now bees to the primary biological and economic role played by bees in the pollination of cultivated and wild plants. Beekeeping industry also offers many other important products like royal jelly, pollen, bee venom, beeswax and propolis. Beekeeping with appropriate bee species should be taken up according to local floral and agro climatic and available technical know-how. The Indian bee hive, *Apis cerana indica Fab*., is found almost in all parts of the country, except perhaps the cold and hot desert because of non availability of flora.

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