International Standard Serial Number (ISSN): 2249-6807

International Journal of Institutional Pharmacy and Life Sciences 4(3): May-June 2014

INTERNATIONAL JOURNAL OF INSTITUTIONAL PHARMACY AND LIFE SCIENCES

Life Sciences **Original Article……!!!**

Received: 05-01-2013; Revised; Accepted: 02-05-2014

EFFICIENCY OF DIFFERENT MODES OF HONEYBEE POLLINATION ON QUALITATIVE AND QUANTITATIVE IMPROVEMENT OF HONEY PLANT, *AMMI MAJUS* L.

K. S. Sowmya* and S. Pradeep

Organic Farming Research Centre, ZARS, Navile, Shimoga

Keywords:

Honey bee, honey plant, yield parameters

For Correspondence:

K. S. Sowmya

Organic Farming Research Centre, ZARS, Navile, Shimoga

E-mail:

ofrcuasb@yahoo.com

ABSTRACT

Pollinating efficiency of honeybee species *viz*., *Apis cerana, A. florea* and *Trigona iridipennis* in cross pollination of honey plant was studied during 2007. In honey plant, significantly maximum 100 fresh umbel weight (33.86 mg), dried umbel weight (17.11 mg), number of seeds per umbel (84.87 seeds/ umbel), percent filled seeds (91.90 %), test weight (9.58 mg), oil content (0.16 %) and germination (79.00 %) were recorded in open pollinated plots, followed by plots caged with *A. florea*, *A. cerana*, *T. iridipennis* and lowest was recorded in control plots (Pollinators were not allowed by caging).

INTRODUCTION

Honey plant is an important biennial herbaceous plant belonging to the family Umbelliferae. The plant is indigenous to Egypt and is widely distributed in Europe, Mediterranean region, Abyssinia and west Africa. It has gained recognition as an export material. The crop is grown commercially for supplying the raw materials to therapeutic industries. The seeds possess 60 per cent of the furano-coumarins. Xanthotoxin is the major component in the seeds of honey plant which increases the melanin pigment in the skin on exposure to ultra-violet rays. It is commonly used in the treatment of leucoderma or vitiligo and also in formulating suntan lotions. (Ajit singh, 1995). Plant-pollinator relationship in most of the medicinal crops revealed many research gaps that are to be filled by making use of efficient bee pollination, except some of the studies by Youngken (1950); Barbier (1958); Sajjanar (2002) and Shilpa (2006) on bee pollination in some of the medicinal and aromatic crops. Hence, the study was undertaken to know the pollinating efficiency of honeybees in qualitative and quantitative improvement of honey plant.

MATERIALS AND METHODS

Investigations were carried out at Department of Horticulture, University of Agricultural Sciences, GKVK, Bangalore during 2007. The field experiment was laid out in randomized complete block design with four replications and each replication with five treatments *viz*., open pollination plot, plots caged with three honey bee species viz., *A. cerana, A. florea* and *T. iridipennis* and control plot (Pollinators were not allowed by caging). The tagged inflorescence (umbel) were harvested as and when they are matured from each treatment to record quantitative parameters such as per cent flower drop, 100 fresh umbel weight, 100 dry umbel weight, number of seeds per umbel, per cent filled seeds and 1000 seed weight (Test weight). The qualitative parameter like oil content was estimated by subjecting 100g of matured dried seeds from each treatment to steam distillation process (Farooqi and Sriramu, 2001) and per cent germination test was recorded by subjecting matured seeds to germination test. The germination test was conducted as per the procedure of ISTA by using top paper method at temperature of 25-30^0 C and 90-95 per cent relative humidity.

RESULTS AND DISCUSSION

The quantitative and qualitative parameters of honey plant showed significant variation among different modes of pollination (Table 1). **Flower drop (%)** Significantly high percentage of flower drop was recorded in control (22.37%), followed by plots caged with *T.*

iridipennis (19.88%), *A. cerana* (12.90%) and *A. florea* (9.45%) and the least flower drop was recorded in open pollination (4.45%).

100 fresh umbel weight

Significantly maximum 100 fresh umbel weight was recorded in open pollination (33.86 mg), followed by plots caged with honeybee species viz., *A. florea* (30.96mg), *A. cerana* (23.02 mg), *T. iridipennis* (15.81 mg) and least weight was recorded in control (14.14 mg).

100 dry umbel weight

Open pollinated plot recorded significantly higher 100 dry umbel weight (17.11 mg), followed by plots caged with *A. florea* (15.43 mg), *A. cerana* (11.04 mg), *T. iridipennis* (7.90 mg) and least weight was recorded in the control (7.14 mg).

Number of seeds per umbel

Differences in the number of seeds per umbel among the treatments were found to be significant. The highest number of seeds/umbel was recorded in open pollinated plot (84.87), followed by *A. florea* (68.32), *A. cerana* (62.70), *T. iridipennis* (59.25) and control (53.56).

Filled seeds (%)

Per cent filled and unfilled seeds in different pollination modes differed significantly with the highest per cent of filled seeds in open pollination (91.90%), followed by plots caged with *A. florea* (90.82%), *A. cerana* (88.28%) and *T. iridipennis* (79.39%). The control plots recorded the lowest per cent filled seeds (69.33%).

1000 seed weight (Test weight)

The maximum 1000 seed weight was recorded in open pollinated plot (9.58 mg), followed by plots caged with *A. florea* (9.28 mg), *A. cerana* (8.27 mg), *T. iridipennis* (7.89mg) and the lowest seed weight was recorded in control (6.09 mg).

Oil content (%)

The oil content of the seeds was maximum in open pollination (0.16 %) compared to caged plots with *A. florea* (0.13%), *A. cerana* (0.11 %) and *T. iridipennis* (0.05 %). The minimum oil content in seeds was recorded in control plot (0.03%).

Germination (%)

The germination per centage was maximum in open pollination (79.00%), followed by plots caged with *A. florea* (72.50%), *A.cerana* (68.00%) and T.iridipennis (61.50%). The least germination per centage was recorded in control (54.20%). A. cerana and A. florea pollination plots were on par with each other.

Among honey bee species, *Apis florea* has some contribution in effecting the pollination of honey plant and it was one of dominant bee species visiting the crop. Hence, *A. florea* is the best pollinator in honey plant in improvement of crop both quantitatively and qualitatively. The present findings are in agreement with the findings of Barbier (1958 and 1962) in spike lavender, Ruijter *et.al.* (1991) in sweet pepper, Goodman and Williams (1994) in white clover, Sajjanar (2002) in *Ocimum sp.* and Shilpa (2006)in chamomile.

REFERENCES

AJIT SINGH, 1995. *Ammi majus* L. *Advances in Horticulture Medicinal and Aromatic plants. Eds*: Chadha, K. L and Rajendra gupta. Vol 11- pp 527-533.

BARBIER, E. D., 1958. Mutual advantages of a natural association between lavandin and bees.Pollination of lavandin,its effects on flowers. *C. R. Acad. Agric. Fr.*, 44: 623-628.

FAROOQI, A. A. AND SRIRAMU. 2001. History, present status,future prospects of essential oil crops. Cultivation of medicinal and aromatic crops. University press. Pp. 265-292.

GOODMAN, R.D. AND WILLIAMS, A.E., 1994. *Honeybee* pollination of white clover (*Trifolium repens* L.). *Australian Journal of Experimental Agriculture*, 34 (8): 1121-1123.

RUIJTER, A-DE, EIJNDE, J-VAN-DEN, STEEN, J-VAN-DER., 1991. Pollination of sweet pepper (*Capsicum annuum* L.) in greenhouses by honeybees. *In: The sixth* international *symposium on pollination, Tilburg, Netherlands*, pp. 270-274.

SAJJANAR, M.S., 2002. Studies on pollination potentiality of Indian honeybee (*Apis cerana* Fab.) on *Ocimum kulimandscharicum*. Guerke. and *Ocimum gratissimum* L. M. Sc. (Agri) thesis, University of Agricultural Sciences, GKVK, Bangalore.

SHILPA, P., 2006. Insect pollinators of selected aromatic crops with special reference to chamomile, *Matricaria chamomilla* L. M.Sc (Agri) thesis, University of Agricultural Sciences, GKVK, Bangalore.

YOUNGKEN, H. W., JR., 1950. Drug plant gardens and apiculture. In *lowa state Apirist Rpt*. 1949. 115-122.

Table- 1: Effect of different pollination modes on yield parameters of honey plant, *A. majus* L.

Pollination mode	Per cent flower drop	100 fresh umbel wt. (mg)	100 dry umbel wt. (mg)	No. of seeds per umbel	per cent filled seeds	1000 seed wt. (mg)	% Oil content	Germinati-on (%)
Open pollination	4.45 (12.17) [a]	33.86 (5.90) [d]	17.11 (4.25) [e]	84.87 (9.26) [e]	91.90 (73.50) [e]	9.58 (3.25) [e]	0.16 (2.34) [e]	79.00 (63.82) [d]
Apis florea	9.45 (17.90) [ab]	30.96 (5.65) [c]	15.43 (4.05) [d]	68.32 (8.32) [d]	90.82 (72.36) [d]	9.28 (3.20) [d]	0.13 (2.04) [d]	72.50 (58.58) [c]
Apis cerana	12.90 (21.04) [bc]	23.02 (5.90) [d]	11.04 (3.46) [c]	62.70 (7.98) [c]	88.27 (69.99) [c]	8.28 (3.04) [c]	0.11 (1.94) [c]	68.00 (54.94) [c]
Trigona iridipennis	19.88 (26.48) [c]	15.81 (4.10) [b]	7.90 (2.98) [b]	59.25 (7.76) [b]	79.39 (63.00) [b]	7.89 (2.98) [b]	0.05 (1.28) [b]	61.50 (49.69) [b]
Control	22.37 (26.65) [c]	14.14 (3.89) [a]	7.14 (2.85) [a]	53.56 (7.38) [a]	69.33 (56.37) [a]	6.09 (2.66) [a]	0.03 (0.99) [a]	54.20 (43.79) [a]
Mean	**13.81**	**23.56**	**11.72**	**65.74**	**83.94**	**8.22**	**0.09**	**67.04**
S.E.M. ±	**2.98**	**0.36**	**0.06**	**0.19**	**0.29**	**0.09**	**0.01**	**0.24**
CD at 5%	**9.20**	**1.11**	**0.19**	**0.61**	**0.90**	**0.28**	**0.01**	**0.73**

Figures in the parenthesis are $\sqrt{X+1}$ transformed values.

Means followed by same letter in a column do not differ significantly by DMRT at 5 per cent level.