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Evaluate the pollination efficiency of different insect pollinators in mango (*Mangifera indica* L.) var. amrapali

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Abstract

In the present research Amrapali var. of mango was taken to study the insect pollinators efficiency at main experimental station (MES) Horticulture & Apiculture laboratory NDUAT kumarganj Faizabad (U.P.) India during 2014. Pollination efficiency can be find out based on time spend (sec/flower), no. of flower visited by insects/min. & no. of loose pollen grains/foragers. *Apis mellifera* L. are the most efficient pollinators of mango flowers followed by Blue bottle fly & *Apis dorsata* under agro- ecological conditions of NDUAT kumarganj Faizabad.

Keywords: Insect-pollinators, mango, foraging rate, foraging speed, pollen grains

Introduction

The flowering duration in mango is usually of short i.e. 2-3 weeks. The flowers of mango are polygamous and produce on terminal panicles varying in length from a few inches up to two feet. Each panicle carries from 200 to 300 up to more than 4000 flowers depending upon the variety and climatic conditions. Mango flowers are usually very tiny (6-8mm in diameter). The calyx is composed of 5 sepals and the corolla of 5 whitish to pinkish petals. All this inserted on a hemispherical disk. Mango trees bear two types of flowers: the hermaphrodite and the male flower. They are both of the same size and give the inflorescence a sweet smell. The pollen grains are oval or triangular or oblong shapes ranging from 20-35 micron. The nectar production was continuous and in small amounts on an average 0.045 micro liter/flower. Mango is mainly cross pollinated as 65% of the perfect flowers were never pollinated, indicating that wind is not an effective pollinating agent.

Material and methods: the pollination studies in mango variety Amrapali was carried out under sodic soil condition and experimental site is located at Main Experimental Station, Department of Horticulture, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) during 2014. The foraging rates of different type of insect visitors were recorded in the term of flowers visited /pollinators/minute. Foraging speed of bees will be recorded in terms of the time spent per flower (in seconds) by each species. The number of loose pollen grains will be collected from the body of insect visitors. Observe on an average 10 individuals of each insect species for counting the pollen grains.

Result and discussion: The average maximum foraging rate was taken by *A. mellifera* (12.48 flowers / 5 min.), followed by Syrphid fly (12.13 flowers / 5 min.), Blue bottle fly (10.32 flowers / 5 min.), *T. irridipennis* (7.19 flowers / 5 min.) and *A. dorsata* (6.21 flowers / 5 min.) respectively. The average minimum foraging rate was recorded from *A. florea* (5.98 flowers / 5 min.). The average maximum foraging speed was recorded from blue bottle fly (9.37 Sec. / flower), followed by *A. dorsata* (11.39 Sec. / flower), Syrphid fly (12.68 Sec. / flower), *T. irridipennis* (13.37 Sec. / flower) and *A. florea* (13.88 Sec. / flower) respectively. The average minimum foraging speed was recorded from *A. mellifera* (14.62 Sec. / flower). The average no. of maximum loose pollen grains adhere to the body of *A. mellifera* (2000 pollen grains/bees), followed by *A. dorsata*, *A. florea*, *T. irridipennis* and Syrphid fly with 1353, 1137, 832 and 413 pollen grains/foragers respectively, and the average no. of minimum loose pollen grains was adhere to the body of Blue bottle fly (335 pollen grains/flies). On the basis of this finding *Aapis mellifera* L. was most efficient followed by blue bottle fly and *Apis florea* Fab. was least efficient pollinators.

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Table 1: Effect of day hours on foraging rate of insect pollinators during, 2014

Hours	No. of flowers visited/ pollinator/ 5 min.						
	Syrphid fly	Blue bottle fly	Rock bee	Italian bee	Little bee	Dammer bee	Mean
H1(0900-1100)	16.10 (4.07)	12.94 (3.66)	9.02 (3.08)	14.32 (3.84)	8.90 (3.06)	6.10 (2.57)	11.23 (3.42)
H2(1100-1300)	11.34 (3.44)	9.34 (3.14)	6.93 (2.73)	12.97 (3.67)	7.06 (2.74)	6.47 (2.64)	9.02 (3.08)
H3(1300-1500)	5.97 (2.54)	6.28 (2.60)	2.43 (1.71)	9.42 (3.15)	2.03 (1.59)	10.5 (3.32)	6.12 (2.57)
H4(1500-1700)	15.12 (3.95)	12.73 (3.64)	6.47 (2.64)	13.24 (3.76)	5.96 (2.54)	5.71 (2.49)	9.87 (3.22)
Mean	12.13 (3.55)	10.32 (3.29)	6.21 (2.59)	12.48 (3.60)	5.98 (2.55)	7.19 (2.77)	9.06 (3.09)
SEm±	0.02	0.30	0.03	0.03	0.03	0.02	0.97
CD at 5%	0.06	0.92	0.09	0.09	0.09	0.07	2.93

Table 2: Effect of day hours on time spent by insect pollinators on the mango flowers during blooming period, 2014.

Hours	Time spent(sec./flower)						
	Syrphid fly	Blue bottle fly	Rock bee	Italian bee	Little bee	Dammer bee	Mean
09:01-11:00	12.75 (3.64)	9.97 (3.24)	11.90 (3.52)	14.93 (3.93)	15.21 (3.96)	13.97 (3.80)	13.12 (3.69)
11:01-13:00	12.71 (3.63)	9.21 (3.12)	11.30 (3.44)	14.88 (3.92)	13.24 (3.71)	12.98 (3.67)	12.38 (3.59)
13:01-15:00	12.29 (3.57)	8.98 (2.08)	11.24 (3.43)	14.56 (3.88)	13.62 (3.76)	13.10 (3.68)	12.29 (3.57)
15:01-17:00	12.93 (3.66)	9.34 (3.14)	11.13 (3.41)	14.09 (3.76)	13.48 (3.74)	13.42 (3.73)	12.39 (3.59)
Mean	12.68 (3.63)	9.37 (3.14)	11.39 (3.45)	14.62 (3.89)	13.88 (3.79)	13.37 (3.72)	12.55 (3.61)
Sem±	0.07	0.20	0.14	0.16	0.43	0.19	0.15
CD at 5%	0.23	0.62	0.43	0.48	1.31	0.57	0.44

Table 3: Number of loose pollen-grains sticking on the body of different insect visitors on mango flowers during, 2014

Pollinators	No. of loose pollen grains sticking on the body of bee species on different replications					
	R1	R2	R3	R4	R5	Mean
Syrphid fly	452	410	385	400	419	413
Blue bottle fly	350	370	310	327	320	335
Italian bee	2004	2113	1935	2142	1806	2000
Rock bee	1150	1825	1167	1275	1350	1353
Little bee	1005	1135	1215	1010	1320	1137
Dammer bee	831	851	830	863	785	832

Table 4: Pollination efficiency of different insect pollinators on Mango flowers during, 2014.

Pollinators	Time spend (sec./flower)	No. of flower visited/min.	No. of loose pollen grains/foragers	Pollination efficiency
Syrphid fly	12.68	12.13	413	4 th
Blue bottle fly	9.37	10.32	335	2 nd
Rock bee	11.39	6.21	1353	3 rd
Italian bee	14.62	12.48	2000	1 st
Little bee	13.88	5.98	1137	6 th
Dammer bee	13.37	7.19	832	5 th

Conclusion

From above maximum studies it's conducted that *Apis mellifera* L., *Apis dorsata*, *Apis florea*, *Trigona irridipennis*, syrphid fly, blue bottle fly are efficient pollinators and *Apis mellifera* L. is the most efficient pollinators among other pollinators of mango. So by augmenting honey bee colony in mango orchard we can increase that quality and quantity of mango fruits.

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