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Developmental Characteristics of Bumblebee, *Bombus ignitus* by the First Oviposition Day

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Objectives

It was investigated whether developmental characteristic of foundation queens of *Bombus ignitus* collected in the 11 localities including Jeongsun have any effects by the first oviposition days.

Materials and Methods

Materials - insect : foundation queens of *Bombus ignitus* collected in the 11 localities

Methods - we investigated the rate of colony foundation, progeny-queen production and the number of adults emergence for the relationship between first oviposition day and colony development of *B. ignitus*

Results and Discussion

It was investigated whether developmental characteristic of foundation queens of *Bombus ignitus* collected in the 11 localities in Korea would be affected by the first oviposition days of them. The first ovipostion day was classified as 1-4days (Immediate Early), 5-6days (Early), 7-10days (Delayed Early), 11-20days (Medium), 21-40days (Late), and above 41days (Very Late). The queen that had the early first oviposition day, i.e., laid eggs so early after starting to be raised indoors, showed much higher rate of colony foundation and progeny-queen production and much less rate of periods in colony foundation and worker emergence. Besides, the numbers of worker and progeny-queen emerged from the queen that had the early first oviposition day were much higher than the queen that had the late first ovipositon. In results, the queen that had the early first oviposition day could make colony stronger and could make colony formation period shorter, therefore, the first oviposition day of foundation queen was proved to be a criterion for selecting super colonies when raising *B. ignitus* indoors.

Table 1. Colony development of foundation queens of *B. ignitus* by the first oviposition day

First oviposition day[1)]	Rate of colony foundation (%)[2)]	n[4)]	Periods of colony foundation (days)[2),3)]	n[4)]	Rate of progeny-queen production (%)[2)]	n[4)]
IE	95.4	44	53.5±5.4 a	35	79.5	44
E	94.3	53	53.7±6.6 a	43	62.3	53
DE	91.3	23	49.1±4.4 a	16	73.9	23
M	60.0	20	54.3±9.9 a	9	50.0	20
L	45.5	11	68.3±7.8 b	2	27.3	11
VL	11.1	18	60.0±2.8 ab	2	22.2	18

1) Duration up to first oviposition after rearing of foundation queen. For abbrevation, see legend to Fig. 1.

2) Statistical analysis: Rate of colony foundation; Chi-square test; $x2=76.19$, $p<0.001$

Periods of colony foundation; Tukey's pairwise comparison test $F=5.36$, $p<0.001$

Rate of progeny-queen production; Chi-square test, $x2=25.49$, $p<0.001$

3) The figures stand for means±SD. Means followed by different letters in the same column are significantly different at $p<0.001$ by Tukey's pairwise comparison test.

4) n means the number of colony surveyed

Table 3. Number of adults produced from foundation queens of *B. ignitus* and longevity of foundation queen by the first oviposition day

First oviposition day1)	Number of adults produced						Longevity of foundation queen (days)[2)]	n[3)]
	Worker[2)]	n[3)]	Male[2)]	n[3)]	Queen[2)]	n[3)]		
IE	159.4±56.8 a	42	562.8± 201.1 a	41	38.8±50.2	35	90.0±24.7	33
E	175.6±68.5 a	50	537.0± 193.5 a	50	26.3±23.8	33	87.8±22.0	50
DE	181.1±52.2 a	21	620.7± 201.6 a	21	35.6±51.1	17	90.4±23.6	18
M	141.4±52.9 a	11	532.5± 303.9 a	11	35.1±38.2	10	93.3±28.7	6
L	106.4±95.4 ab	5	285.3± 158.2 ab	3	3.5± 3.5	2	88.6±35.7	9
VL	42.4±41.8 b	5	105.2± 117.1 b	5	6.8±10.2	4	105.2±35.1	18

1) For abbrevation, see legend to Table 1.

2) The figures stand for means±SD. Means followed by different letters in the same column are significantly different at $p<0.001$ for number of worker and at $p<0.05$ for number of male by Tukey's pairwise comparison test.

3) n means the number of colony surveyed

Reference

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