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ASSESSMENT OF BIOLOGICAL AND BEHAVIORAL
CHARACTERISTICS OF COLONIES OF *APIS MELLIFERA*
SICILIANA AND *APIS MELLIFERA LIGUSTICA* IN SICILY

*Valutazione di caratteristiche biologiche e comportamentali di colonie
di Apis mellifera siciliana e Apis mellifera ligustica in Sicilia*

Honey bees show great diversity and geographic variation, leading to the differentiation of numerous local subspecies and ecotypes. On the Italian island of Sicily a distinctive honey bee population evolved and was classified as the subspecies *Apis mellifera siciliana* Dalla Torre, the autochthonous Sicilian black bee, present on the island since ancient times. In the 20th century, massive importation of *Apis mellifera ligustica* queen bees from the Italian peninsula, threatened the local genetic heritage of *A. m. siciliana* due to hybridization (LONGO & LODESANI, 2000). A project for the conservation of *A. m. siciliana* was funded, in 2012, by the Sicily Region and coordinated by the ex Honey bee and Silkworm Research Unit of the Agricultural Research Council (CREA) with the aim of reintroducing and protecting this subspecies in Sicily. As part of the project, a study was conducted with the aim of deepening the knowledge on the native black bee compared to the Italian bee and specifically on the biological and apicultural features of the two subspecies.

Surveys were carried out in the apiary of University of Catania during a period of one year from spring 2014 to 2015. The apiary is located within an experimental farm where citrus, olive, prickly pear, pomegranate, horticultural and others plants are cultivated and provide honey bees with nectar and pollen throughout the active season. Fourteen colonies of *A. m. ligustica* and 13 of *A. m. siciliana* were set up by introducing queens of the same age coming from beekeepers registered in the National Register of

Italian Bee Breeders (<https://www.crea.gov.it/en/web/agricoltura-e-ambiente/-/national-register-of-italian-honey-bee-breeders>). Colonies of homogeneous strength between the two groups, were housed in Dadant Blatt hive boxes. The surveys were carried out monthly, checking each hive in order to record number of bees, quantity of brood, honey and pollen, using visual estimation of the combs (ACCORTI, 1985; IMDORF & GERIG, 2001; DELAPLANE *et al.*, 2013). The evaluation of swarming and hygienic behavior by “pin test” were evaluated according to UZUNOV *et al.* (2014); the infestation by *Varroa destructor* mite was also evaluated (“icing sugar test”). Data analysis was conducted taking into consideration only those colonies in which the introduced queen had not been superseded and had not undergone changes in the structure of the colony. The results for the main parameters examined are summarized in table 1. The amount of brood produced by *A. m. siciliana* in spring – summer 2014 was lower than that produced by *A. m. ligustica*, showing, however, higher values in November and in the period of transition from winter to spring. Similar trends were recorded for the number of worker bees on combs. However, the analysis by Student’s t-test and ANOVA did not show a significant difference. The average amount of honey found in the combs was higher in *A. m. siciliana* in almost all surveys, with significant differences only in the surveys of May, June, and July 2014. The amount of pollen collected by foraging bees of the two groups was not significantly different. Results of observations on behaviour, particularly related to docility and calmness (“sitting on the comb”), showed a general greater gentleness of *A. m. ligustica* compared to *A. m. siciliana*; bees of the *ligustica* subspecies also showed a lower tendency to move away from the comb during direct observations of the colony.

A. m. siciliana colonies showed a greater tendency to swarm, observed in spring 2015 by the formation of numerous swarms near the apiary. Specifically, between March and April 2015, 38% of *A. m. siciliana* colonies had produced swarms compared to 31% of *A. m. ligustica*.

The hygienic behavior of the two subspecies was slightly higher for *A. m. siciliana*, but the differences between the means are within the normal variability in the populations of the two subspecies. Varroa mite infestation was not significantly different between the two subspecies although slightly higher number of mites were recorded in the Italian bee.

Apis mellifera siciliana is considered an evolutionary bridge between the subspecies of African and European origin and this is evident in some biological features such as the tendency to swarming and building a higher number of royal cells compared to European subspecies, and the polygyny observed in African bees (LONGO & MAZZEO, 2020). The results of our study

Table 1.

Evaluation of the families of the two subspecies of Apis mellifera: mean and standard error (S.E.) of the main parameters considered

Date of survey	Brood on honeycomb (square decimeters, mean±S.E.)		Number of honeybees on combs (mean±S.E.)		Honey on honeycomb (square decimeters, mean±S.E.)		Pollen on honeycomb (square decimeters, mean±S.E.)	
	<i>A. m. siciliana</i>	<i>A. m. ligustica</i>	<i>A. m. siciliana</i>	<i>A. m. ligustica</i>	<i>A. m. siciliana</i>	<i>A. m. ligustica</i>	<i>A. m. siciliana</i>	<i>A. m. ligustica</i>
02.04.2014	40.5±4.55	47.31±3.68	11300.40±1043.64	15480.56±1528.94	---	---	---	---
05.05.2014	50.05±4.51	61.87±5.13	15209.55±655.72	17246.25±1183.34	44.85±3.43	24.75±5.58	2.200±0.77	2.56±1.55
05.06.2014	45.3±5.81	48.94±8.59	17388.60±957.98	14590.88±540.32	56.40±4.69	36.00±5.92	6.100±1.61	8.44±1.63
08.07.2014	25.5±1.78	41.19±2.98	13161.90±821.18	12804.66±1220.94	74.45±4.43	60.84±2.96	8.350±2.95	10.50±1.15
13.08.2014	23.7±1.94	35.12±2.14	13479.45±1322.91	12695.16±667.38	65.50±1.26	57.72±3.27	1.650±1.02	0.69±0.38
09.09.2014	18.3±1.44	23.44±3.84	11946.45±821.32	10826.81±739.76	72.00±2.42	63.19±3.51	0.450±0.12	1.00±0.37
10.10.2014	14.65±2.82	17.62±2.28	6712.35±772.65	6645.28±1013.14	50.25±7.45	51.31±7.65	2.550±0.89	1.59±0.39
14.11.2014	11.2±2.87	9.81±1.66	8146.80±2074.40	8116.69±1225.20	50.00±8.18	47.01±7.64	2.600±1.16	1.34±0.40
04.03.2015	44.65±8.49	30.09±4.81	19681.53±3217.92	10525.69±1627.37	41.60±5.27	41.78±6.73	4.195±1.30	3.93±0.72
09.04.2015	30.1±9.48	42.91±8.09	15351.90±1850.97	15056.25±2551.34	39.94±6.63	33.92±5.36	5.940±2.86	3.47±0.82

showed very slight differences between the two subspecies that in part differ from what observed by UZUNOV *et al.* (2014) and major deepings are needed to better define the biological features of the Sicilian black bee.

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