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PP-413 [Bee Biology]

BEE SCIENCE NUTRITION

By DULCOFRUCT

Development of a carbohydrate feeding product for honey bees (Apis mellifera) with beneficial effects on their lifespan

Authors: Dr. Popovici Daniel Cristian, Ing. Pătrașcu Grațiela

ABSTRACT:

Background and problem description: Recent researches has shown that the longevity of honey bees (Apis mellifera) is more and more affected by specific pathogens but also by xenobiotic components existing in the environment. In order to counteract their negative effects as much as possible, the use of phytonutrients with strong antioxidant role in supplementary feeding is one of the solutions.

Purpose: To this end, we focused on testing a hydric extract of Siberian ginseng root (Eleutherococcus senticosus) administered on solid carbohydrate support of fondant and candy type (Candy board energetic®) equivalent of 0.1g root powder/100g product.

Methodology: In this regard, a laboratory experiment was set up in Romania, carried out and repeated during the active season (May-July) of 2022 and 2023, for a duration of up to 28 days, on two groups (experimental and control), each consisting of 3 cages populated with 100-300 young non-flying bees collected from the same colony at time of cages population. The cages were checked out daily to record honeybee mortality. Two statistical tests were used to evaluate honeybees' longevity (SPS: Kaplan-Meier; Cox regression).

Practical implications for beekeepers: Supplementary feeding with Siberian ginseng root extract (Eleutherococcus senticosus) represents a promising option to improving supplemental feeding with substances that have beneficial effects on the lifespan of honeybees, having a positive impact both during the production period and during inactive periods of the year that involve resource conservation.

Materials & Metodology:

1st Stage, 2022:

- Period: May 15 – June 10, 2022
- 400–800 bees per group, in 3 cages, with 100–300 bees per cage
- The bees were fed with various substances and extracts, all using the same carbohydrate base
- Group 33 stood out, fed with an aqueous extract of ginseng (Eleutherococcus senticosus) = extract from 1 g of dried root per 1 kg of energy feed
- Carbohydrate base = Candy Board Energetic, to which the plant extract specific to each group was added
- Commercial Candy Board Energetic feed without any added extract = Group 1, control group
- Bees used = from artificially created swarms of controlled age – bees younger than the orientation flight stage
- Dead bees were counted every 2 days

2nd Stage, 2023:

- Period: July 1–21, 2023
- A procedure similar to the 2022 stage was applied
- Number of bees used: between 148 and 353 bees per group, divided into 2–3 cages per group
- Dead bees were counted daily, and on day 21 — the final day of the experiment — the live bees were also counted
- Test feeds: fondant – Group 1, fondant with ginseng extract – Group 2, Candy Board Energetic – Group 6, and candy with ginseng extract – Group 7
- The candy-based feed used in Groups 6 and 7 was 17 months old at the time of the experiment
- At the end of each experiment, the data obtained were entered into an SPS database, and Kaplan-Meier tests along with Cox regression were used for analysis

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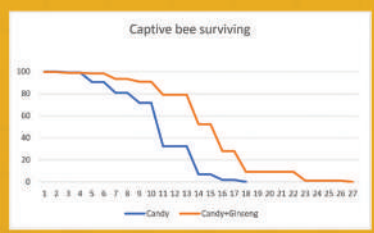
Results:

The obtained results show that the honey bees in all experimental variants had significantly higher longevity ($p<0.001$) compared to the control group in which the bees were maintained only on carbohydrate feeding, free of added phytonutrients.

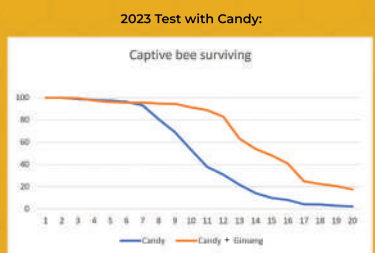
Lot	Number of dead bees, per day											Total
	Day2	Day4	Day6	Day8	Day10	Day12	Day15	Day17	Day19	Day24	Day28	
Candy Board Energetic (control)	0	5	61	69	64	276	180	36	13	0	0	714
Candy with Ginseng	1	5	3	27	14	65	145	132	103	44	7	556

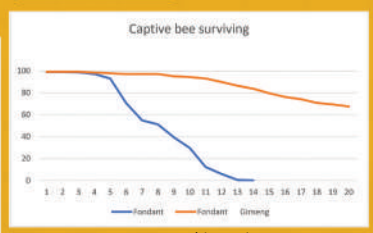
Group	Number of dead bees per day																			Living in 21 day	Total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
Fondant (control group)	3	0	1	6	14	80	55	13	42	34	61	23	19	2	0	0	0	0	0	0	353
Ginseng Fondant (experimental group)	1	0	0	1	1	1	0	0	3	1	2	5	5	4	6	5	3	5	2	3	148
Candy with Ginseng (experimental group)	0	0	1	5	3	1	0	2	1	7	6	14	46	21	14	17	37	6	4	7	233
Candy Board Energetic (control group)	0	0	4	3	2	4	11	43	40	55	53	24	32	26	15	6	13	1	4	2	346



2022 Test with Candy:

2023 Test with Candy:





2023 Test with Fondant:

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Popovici Daniel Cristian
Research and Development Department, SC Cirast SRL (Dulcofruct Bee Nutrition Science), Goleştii de Sus, Coteşti, Vrancea County, Romania

Background and problem description: Recent researches has shown that the longevity of honey bees (Apis mellifera) is more and more affected by specific pathogens but also by xenobiotic components existing in the environment. In order to counteract their negative effects as much as possible, the use of phytonutrients with strong antioxidant role in supplementary feeding is one of the solutions. PURPOSE: To this end, we focused on testing a hydric extract of Siberian ginseng root (Eleutherococcus senticosus) administered on solid carbohydrate support of fondant and candy type (Candy board energetic®) equivalent of 0.1g root powder/100g product. METHODOLOGY: In this regard, a laboratory experiment was set up in Romania, carried out and repeated during the active season (May-July) of 2022 and 2023, for a duration of up to 28 days, on two groups (experimental and control), each consisting of 3 cages populated with 100-300 young non-flying bees collected from the same colony at time of cages population. The cages were checked out daily to record honeybee mortality. Two statistical tests were used to evaluate honeybees' longevity (SPSS: Kaplan-Meier; Cox regression). Results and CONCLUSION: The obtained results show that the honey bees in all experimental variants had significantly higher longevity ($p<0.001$) compared to the control group in which the bees were maintained only on carbohydrate feeding, free of added phytonutrients. Practical implications for beekeepers: Supplementary feeding with Siberian ginseng root extract (Eleutherococcus senticosus) represents a promising option to improving supplemental feeding with substances that have beneficial effects on the lifespan of honeybees, having a positive impact both during the production period and during inactive periods of the year that involve resource conservation.