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Final Report

An efficacy study of the BEE-VITAL-HIVE CLEAN mite control product in commercial apiaries

2005

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1. SUMMARY

Denomination of the test item: Bee-Vital-Hive Clean mite control product

Active ingredient: oxalic acid

Objective of the experiment: to study the efficacy of the test item (a mite control product), which is environmentally friendly and lives up to expectations of stricter and stricter honey quality requirements.

Test species: honeybee (Apis mellifera)

Mode of treatment: sprinkling

Doses: 15 ml/colony

Results

The Bee Vital Hive Clean (BVHC) mite control product applied in several apiaries at different times showed outstanding laboratory and field results. The ingredients of the product are oxalic acid (a.i.), propolis, sacharose, citric acid and essential oils. The ingredients and their origin mean a low burden on the environment and guarantee environmentally friendly honeybee treatments. The BeeVital-HC product is easy to use and exceedingly suitable for the sprinkling treatments of hives and bee colonies.

2. INTRODUCTION

During the past years, concerns caused by the varroa mite did not decrease and the pest is regarded as the first enemy in the country as well as all over the world and influences the work in apiaries. Regular protection against the varroa has highly changed traditional apiculture. The struggle against mites changed notably during the past 20-25 years. Because of the side effects of different mite control products and stricter and stricter quality requirements, the demand for environmentally friendly products is growing.

3. Material and method

3.1 Test item

Sponsor supplied the test item and data about it by sending the 'Certificate of Analysis'. The data below are gained from this document and the label.

3.2 Items used for check and control treatment

3.2.1 *Perizin*

Composition: 1 ml solution contains 32 mg coumaphos.

Practical usage: diagnosing and treating honeybees infested by the varroa mite.

3.2.2 *Antivar*

Composition: 10 ml amitraz solution of 20% and 100 impregnated strips of paper
Formulation: smoking strip
Target animal: honeybee
Indication: diagnosing and treating Varroa destructor infestation.
Mode of application: fumigation

3.3 Test animal

Species: honeybee (Apis mellifera)

Race: Carniolan bee

Number of used bees:

- For the laboratory test: 3 colony groups with 10 colonies in each group
- For the field test: 640 colonies in all

3.4 Selection of colonies and methods

The experimental honey producing colonies and split colonies were placed in 1/2 NB hives, in 3 and 2 supers. In the year 2004, the continuous honey flow and feeding (drop by drop from bottle feeders) in case of necessity provided the continuous development of the colonies. Following the honey flow and last honey extraction, the varroa mite infestation of the colonies was checked and a treatment against the pest started with the BeeVital-Hive Clean (BVHC).

Colony examinations were performed according to the *Examination of the production of bees 2003, OMMI publication.* Three colony groups were formed; each of them included 10 colonies. The first group included a queen reared in 2003, the second and third groups included queens reared in 2004. At the beginning of the studies, the bee colonies were similar in strength and the age and origin of the queens were known. The strength of the colonies (population, brood, feed and queen) was observed before the check and treatment (Table 1). As the colony group means show, the colonies were characterised with the same strength (population: 9.8-11.6, brood: 6.6-8.7). The honey supply at the end of the summer and in spring also indicates similar strength. The environmental conditions and stimulating feeding resulted in a good spring population and the

development of the 3 colony groups (March 2005: 4.1±0.7, 3.9±1.1, 4.5±1.2, April 2005: 5.3 ±0.5, 5.4 ±1.0, 5.5 ±0.7). The behaviour of the bees (staying on combs, calmness, and tendency to swarm and clean) was normal in every colony and was not determinative from the point of view of the results.

On 7th August 2003, the colonies were treated against the varroa mite with an environmentally friendly product (home-made oxalic acid of 3.8%). Its efficacy was checked with amitraz (allopathic, systemic product) on 18th and 22nd September 2003. The last treatment was performed on 4th November, in the brood-free period.

Before treating the colonies in 2004, the spontaneous mite mortality was determined (06-27 August 2004). The results are presented in Table 2 and Appendix 1.

The BeeVital-HC was applied according to the producer's instructions (15ml/colony/treatment) using a sprinkling container of 500 ml capacity with a 50 ml feeder. When applying the Perizin, the same type was used. The Antivar fumigation was carried out at the bottom and back of the hives in the evening hours. The colonies were locked up for an hour. The great advantage of the amitraz method (3 drops/smoking strip) is that although the dose is strong, bees are exposed for a short time (max. 1 hour).

To determine the number of mites, a special bottom board covered with a screen tray is used and there is a clean sheet of paper on the bottom board. The screen separates the bees from the bottom board so it cannot be reached to clean. The number of mites can be easily determined on the sheet of paper.

In August and during the treatment, the weather conditions and temperature were conducive to the BeeVital-HC treatment. The average temperature was 18° C (15-22° C) during the treatment, but being higher in October, the temperature induced prolonged brood in the colonies.

The results of the treatments in detail are presented in Tables 3 and 4 and in Appendix 2. The treatment schedule of the 3 colony groups is presented in a table below. The efficacy of the BeeVital-Hive Clean was checked with fumigation of the authorized Perizin and Antivar.

Treatment schedule			
Group mark	**Time of treatment**	**Active ingredient**	**Product**
1, 2	09.10	oxalic acid	BVHC
1, 2	10.05	oxalic acid	BVHC
3	10.05	coumaphos	Perizin
1, 2, 3,	10.17	coumaphos	Perizin
1, 2, 3,	10.28	amitraz	Antivar

3.5 Efficacy examination of the BeeVital-Hive Clean in case of varroa infestation under laboratory conditions

The BeeVital-HC (composition: water, sacharose, citric acid, oxalic acid, propolis and essential oils) environmentally friendly product is exceedingly suitable for the sprinkling treatments of hives and bee colonies. Applying the product in September 2004 (first treatment) and October (second treatment) the following results were generated. As a result of the treatment, 70% of the experimental colonies were mildly and moderately infested while 30% was strongly infested.

Distribution of infested colonies

Mite infestation	Number of mites	Number of colonies	Rate of infestation (%)
Strong	1650-1000	9	30
Moderate	1000-300	16	53
Mild	up to 300	5	17

The natural mortality of mites corresponds to the average of several years. During the 21 days of observations (3-4 observations/day), on the average 4.1 dead mites were found, which shows great statistical variability (±3.57 min: 0, max: 12), Table 2.

Efficacy of the treatment starting when the number of brood combs decreased is presented in Table 3 and Appendix 2. As a result of the first treatment (BVHC), on average 309 (±226.6) mites died in the case of the queen reared in 2004 and 437.5 (±145.7) mites died in the case of the two-

year-old queen (reared in 2003). In the second treatment 371.7 (±289) and 515.7 (±143.7) mites died respectively. In the third group (control) on average 6.2 (±2.8) mites represented the natural mite mortality while the Perizin treatment resulted in 355 (±124.8) dead mites. After the brood rearing had ceased, one week after the last check, on average 59.5 (±5.7), 36.9 (±28.5) and 44.6 (±30.5) mites died as a result of the diagnosing Perizin treatment. To provide total freedom from mites, amitraz fumigation was performed. It resulted in 1.2 (±1.7), 1.5 (±2.8) and 0.1 (±0.3) dead mites in the experimental colonies.

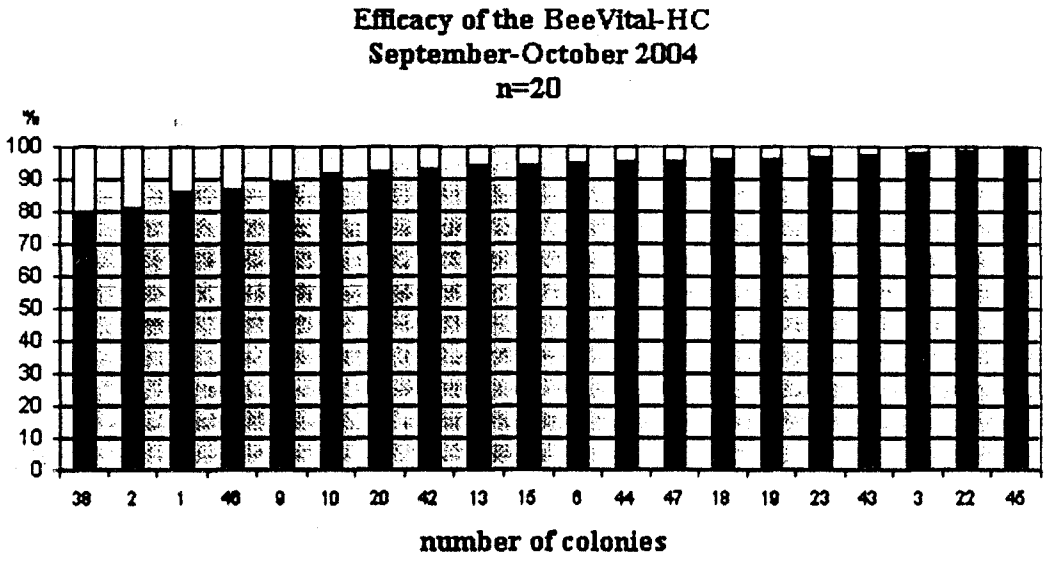
Table 1

Development of experimental colonies (2004-2005)

Ordinal number	Hive mark	queen age	2004 05 Aug population	05 Aug brood combs	05 Aug honey	2005 11 March population	03 April population	03 April honey
1	6	2003	13	10	7	4	5	3
2	46	2003	13	11	6	5	5	3
3	9	2003	10	8	8	4	6	2
4	38	2003	12	8	10	4	5	2
5	13	2003	11	9	7	3	5	3
6	2	2003	10	8	7	5	6	3
7	10	2003	12	9	9	4	5	4
8	3	2003	11	9	8	4	5	3
9	47	2003	10	8	8	3	5	3
10	42	2003	11	7	10	5	6	3
	total		113	87	80	41	53	29
Group 1	**mean**		**11.3**	**8.7**	**8**	**4.1**	**5.3**	**2.9**
	SD		1.2	1.2	1.3	0.7	0.5	0.6
1	1	2004	11	8	9	3	5	1
2	18	2004	12	9	9	3	4	2
3	22	2004	11	8	5	4	5	4
4	43	2004	13	8	6	6	7	3
5	23	2004	12	9	10	5	7	3
6	44	2004	11	7	8	3	5	3
7	19	2004	12	7	9	3	5	2
8	45	2004	10	7	8	4	5	3
9	15	2004	13	9	7	5	6	3
10	20	2004	11	7	7	3	5	3
	total		116	79	78	39	54	27
Group 2	**mean**		**11.6**	**7.9**	**7.8**	**3.9**	**5.4**	**2.7**
	SD		1.0	0.9	1.5	1.1	1.0	0.8
1	25	2004	7	4	6	5	5	2
2	28	2004	9	7	5	5	6	1
3	11	2004	11	7	7	5	6	1
4	12	2004	9	6	7	4	5	3
5	27	2004	10	7	7	5	6	3
6	24	2004	11	8	9	4	5	2
7	16	2004	10	6	9	4	5	3
8	41	2004	12	8	5	7	7	2
9	14	2004	11	8	10	3	5	3
10	29	2004	8	5	10	3	5	3
	total		98	66	75	45	55	23
Group 3	**mean**		**9.8**	**6.6**	**7.5**	**4.5**	**5.5**	**2.3**
	SD		1.5	1.3	1.9	1.2	0.7	0.8

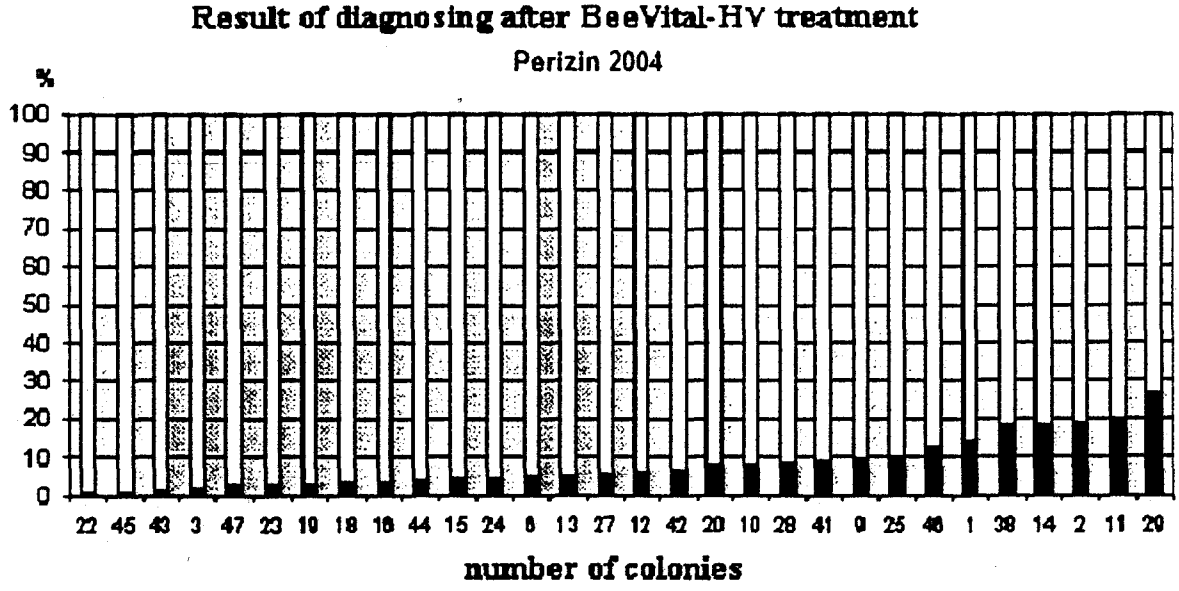
The efficacy of the BeeVital-HC treatment is presented in Figure 1. On the basis of the cumulative mite mortality, the efficacy of the BeeVital-HC was greater than 90% in the 80% of the 20 colonies (i.e. 16/20).

Figure 1



Compared with the total number of mites, the mite mortality was less than 10% in the 23% of the experimental and control colonies after the diagnosing treatment performed with the Perizin. (Figure 2)

Figure 2



3.6 Efficacy examination of the BeeVital-Hive Clean in commercial apiaries

In the eastern part of Hungary (around the city of Debrecen) experimental treatments with the BHVC were carried out in commercial apiaries (in 640 colonies) in spring. The behaviour of 10 colonies was observed in each of the 4 apiaries involved in the experiment. The results are the following:

In 2003 (the previous year) different protection was performed in the apiaries; the number of mites was minimal in the spring of 2004. In 2003 (the year before treatment), the Api-life-var, oxalic acid, Bayvarol and amitraz a.i. were applied in different ways.

In an apiary of 250 colonies the observations were the following:

In 10 colonies the queens were reared in the previous year. NB hives were used; one hive held 18 frames. The first afternoon treatment was performed in March, at a temperature of 18° C (15 ml/colony). The treatment was repeated 3 times (one treatment/week). No other treatment (e.g. with antibiotics) was performed. After the BeeVital-HC treatment, flyouts became notably more active. All the hives had bottom entrances in front of which a higher level of hygienic behaviour was observed. Two more treatments performed in April resulted in further cleaning activities. Mite control was not typical during the springtime brood period.

In the other apiaries, as a result of the spring treatment, flyouts became more active and chalkbrood „mummies" were found in front of the hive entrances only.

In one apiary the bees became more irritable and due to the lack of bee pastures, signs of searching and robbery were observed.

According to observations in the other apiaries, this mode of treatment requires a lot of time especially in spring when the ruins of winter waxing must be removed so bee spaces can be in touch for sprinkling the BVHC.

As a result of the first treatment, the number of dead mites was higher (3-4 mites). After two weeks, the number of dead mites decreased (1 mite) in the experimental colonies. In most cases 1-2 dead bees were found, which cannot be regarded as considerable loss. When there are no available bee pastures, treatments should be performed late in the afternoon. The springtime field treatment of the colonies ended with good results and the colonies started the producing period in good health and free from chalkbrood.

4. Results and summary

The presence of the varroa mite (Varroa destructor) during the past decades has caused the greatest loss in European and Hungarian apiaries as well.

Besides the use of different – known as reliable – acaricides and other preventive materials, a significant number of colonies were lost during every winter and spring.

During the spring of 2004, the damage caused by the varroa mite reached 70% in some Hungarian apiaries.

The losses reflect the unproper use of chemicals and non-sufficient efficacy.

As a result of the continuous threat, regular prevention and protection have become part of productive apiary technologies. Besides the efficacy of acaricides, environmental factors and the impact on human health are the major questions.

Honey, as a symbol of natural sweetness and as an important part of healthy life, cannot be polluted because of unproper (sometimes uncontrolled and overdosed) chemicals.

In Hungary, in commercial beekeeping practice one colony may produce over 50 kg honey/year. These beekeepers do not want to risk their profit so they try to assure their bees' safety as much as they can.

Because of stricter honey quality requirements, residue limits and need for healthy food, there is a greater demand for nature originated (non-synthetic) protective agents.

The Bee Vital Hive Clean (BVHC) – based upon its justified ingredients – can meet these requirements. The efficacy of the BVHC was studied under experimental conditions. The product was used in several apiaries at different times and showed outstanding laboratory and field results.

The main ingredients of the product (BVHC) are oxalic acid, propolis extract, sacharose, citric acid and essential oils. The origin of the ingredients assures low-impact on the environment and guarantees environmentally friendly bee treatments.

The BVHC, as a natural product, can be practical and easy to use. It is very suitable for the sprinkling treatments of hives.

Experimental hives were divided into three groups. All the hives were characterised with the same strength. Natural mite mortality was observed before the treatment using a special bottom board.

The product (BVHC) was applied according to the producer's instruction (15 ml/hive/treatment). Control treatments were carried out with coumaphos and amitraz. The applications were performed in September and October.

After the mite mortality was summed, the efficacy of the BVHC was found to be over 90% in the infested hives after the treatments. A control treatment was performed with the Perizin, which showed the same efficacy.

After the diagnosing treatment, the survival rate of the mites was around 10% in the majority (83%) of the experimental and control hives.

Observations were made in Hungary, in 640 commercial hives during the springtime treatment. The hives had different treatments in every apiary in the previous year (2003). The following acaricides were used during the autumn: Api-Life-var, evaporated oxalic acid, Bayvarol and amitraz (fumed and evaporated).

After using the BVHC, the number of flyouts was higher. Every hive had bottom entrances and after the treatment, a higher level of hygienic behaviour was observed. Two more treatments performed in April resulted in further cleaning activities.

On the other commercial beekeeper sites after the so-called spring check, the flight activity increased and chalbrood mummies were found in front of the hive entrances.

Based on practical experience, during the preparation for the treatment, it is wise to cut the wax built between the top of frames. Thus there would be enough room between combs for sprinkling the BHVC. The fall of the mites was higher after the first treatment than after the second treatment two weeks later.

Based on the results, a better effect can be achieved if a treatment is performed in late afternoon when there is no nectar collection.

The springtime field experiment ended with good results and the colonies were in good health and free of any signs of diseases (chalkbrood mummies were outside the hives). The hives were in good condition to start the season. The outcome of in-situ commercial apiaries gives a global view of this new kind of treatment together with the experimental results.

Table 2

Evaluation of natural mite mortality

Ordinal number	Colony mark	Date of the study 06 Aug	09 Aug	13 Aug	16 Aug	19 Aug	23 Aug	27 Aug	Total	Total Total
1	6	0	0	0	0	0	0	0	0	
2	46	4	0	2	1	2	1	1	11	
3	9	0	1	1	0	0	0	0	2	
4	38	2	0	0	2	0	2	0	6	
5	13	0	1	1	0	1	0	1	4	
6	2	0	0	0	0	0	0	0	0	
7	10	1	2	2	0	2	0	1	8	
8	3	0	0	0	0	0	0	0	0	
9	47	0	0	0	2	0	2	2	6	
10	42	0	0	0	0	0	0	0	0	
Total									37	
Mean									3.7	
SD									3.9	
1	1	0	0	0	0	0	0	0	0	
2	18	1	2	2	0	2	1	1	9	
3	22	0	1	1	1	0	2	0	5	
4	43	2	1	0	2	2	1	2	10	
5	23	0	2	0	1	0	0	1	4	
6	44	1	1	2	0	0	0	1	5	
7	19	1	0	0	2	1	2	0	6	
8	45	0	0	0	0	0	0	0	0	
9	15	2	2	1	0	2	0	1	8	
10	20	1	0	0	0	0	1	0	2	
Total									49	
Mean									4.9	
SD									3.5	
1	25	0	0	0	0	0	0	2	2	
2	28	1	2	0	2	1	0	0	6	
3	11	0	0	0	1	0	0	0	1	
4	12	2	0	1	0	0	0	0	3	
5	27	0	1	0	0	0	1	0	2	
6	24	0	0	0	2	1	0	2	5	
7	16	0	2	0	2	1	2	0	7	
8	41	0	0	1	0	0	0	0	1	
9	14	2	0	1	1	0	1	2	7	
10	29	1	1	0	0	1	1	0	4	
Total									38	123
Mean									3.8	4.1
SD									2.3	3.57

Table 3

Efficacy of the BeeVital-HC

Ordinal number	Colony mark	Product	Date of treatment				Total	Product					Total
		10 Sept	12 Sept	17 Sept	22 Sept	27 Sept		05 Oct	06 Oct	09 Oct	12 Oct	17 Oct	
1	6	BVHC	45	40	46	31	162	BV	87	28	15	10	140
2	46	BVHC	315	104	41	40	500	BV	320	210	103	30	663
3	9	BVHC	20	5	98	22	145	BV	72	16	21	5	114
4	38	BVHC	10	26	31	7	74	BV	81	32	25	8	146
5	13	BVHC	19	24	43	30	116	BV	210	118	32	16	376
6	2	BVHC	84	70	99	42	295	BV	101	12	11	11	135
7	10	BVHC	370	159	118	76	723	BV	433	205	82	47	767
8	3	BVHC	140	203	126	150	619	BV	510	228	79	32	849
9	47	BVHC	67	52	48	14	181	BV	54	50	13	20	137
10	42	BVHC	45	127	76	34	282	BV	229	103	30	28	390
	Total						3097						3717
Group 1	Mean						309.7						371.7
	SD						226.6						289.0
1	1	BVHC	182	64	74	26	346	BV	197	82	15	10	304
2	18	BVHC	215	193	88	12	508	BV	360	148	67	20	595
3	22	BVHC	309	247	102	98	756	BV	439	89	45	8	581
4	43	BVHC	302	178	73	27	580	BV	350	221	89	29	689
5	23	BVHC	194	115	42	58	409	BV	327	162	72	53	614
6	44	BVHC	188	127	62	40	417	BV	313	228	58	20	619
7	19	BVHC	84	54	21	88	247	BV	227	107	41	18	393
8	45	BVHC	175	143	90	16	424	BV	256	123	42	15	436
9	15	BVHC	142	71	81	30	324	BV	331	167	88	40	626
10	20	BVHC	147	107	51	59	364	BV	158	82	50	10	300
	Total						4375						5157
Group 2	Mean						437.5						515.7
	SD	12 Sept	17 Sept	22 Sept	27 Sept	Total	145.7						143.7
	25	0	1	1	1	3	Periz		200	21	11	8	232
2	28	3	3	2	2	10	Periz		320	24	8	6	352
3	11	2	1	1	4	8	Periz		150	37	28	15	215
4	12	2	4	1	1	8	Periz		172	26	20	8	218
5	27	0	1	1	1	3	Periz		318	33	29	10	380
6	24	1	1	2	2	6	Periz		342	57	34	9	433
7	16	1	2	4	4	11	Periz		450	91	12	15	553
8	41	2	1	1	1	5	Periz		431	67	15	8	513
9	14	1	0	1	4	6	Periz		350	44	21	11	415
10	29	1	0	2	1	4	Periz		208	27	10	3	245
	Total					64							3556
Group 3	Mean					6.4							355.6
	SD					2.8							124.8

Table 4

Efficacy of the BeeVital-HC in comparison

Ordinal number	Colony mark	Product	Date of treatment				Product	Date of treatment		
		17 Oct	18 Oct	20 Oct	23 Oct	Total	28 Oct	29 Oct	30 Oct	Total
1	6	Perizin	15	0	0	15	Amitraz	0	0	0
2	46	Perizin	148	16	2	166	Amitraz	2	0	2
3	9	Perizin	24	4	0	28	Amitraz	0	0	0
4	38	Perizin	30	17	3	50	Amitraz	3	0	3
5	13	Perizin	21	6	0	27	Amitraz	0	0	0
6	2	Perizin	80	17	1	98	Amitraz	1	0	1
7	10	Perizin	97	23	5	125	Amitraz	4	1	5
8	3	Perizin	22	6	0	28	Amitraz	0	0	0
9	47	Perizin	6	2	0	8	Amitraz	0	0	0
10	42	Perizin	28	20	2	50	Amitraz	1	0	1
Total						595				12
Mean						59.5				1.2
SD						52.7				1.7
1	1	Perizin	98	8	0	106	Amitraz	0	0	0
2	18	Perizin	35	0	0	35	Amitraz	0	0	0
3	22	Perizin	8	3	0	11	Amitraz	0	0	0
4	43	Perizin	20	2	0	22	Amitraz	0	0	0
5	23	Perizin	23	4	0	27	Amitraz	6	2	8
6	44	Perizin	15	26	1	42	Amitraz	0	0	0
7	19	Perizin	16	3	0	19	Amitraz	0	0	0
8	45	Perizin	6	2	0	8	Amitraz	2	0	2
9	15	Perizin	30	12	3	45	Amitraz	4	1	5
10	20	Perizin	28	25	1	54	Amitraz	0	0	0
Total						369				15
Mean						36.9				1.5
SD						28.5				2.8
1	25	Perizin	14	14	0	28	Amitraz	0	0	0
2	28	Perizin	21	12	0	33	Amitraz	0	0	0
3	11	Perizin	57	2	0	59	Amitraz	0	0	0
4	12	Perizin	13	3	0	16	Amitraz	0	0	0
5	27	Perizin	20	4	0	24	Amitraz	0	0	0
6	24	Perizin	22	0	0	22	Amitraz	0	0	0
7	16	Perizin	19	0	0	19	Amitraz	0	0	0
8	41	Perizin	10	41	2	53	Amitraz	0	0	0
9	14	Perizin	83	14	1	98	Amitraz	1	0	1
10	29	Perizin	62	29	3	94	Amitraz	0	0	0
Total						446				1
Mean						44.6				0.1
SD						30.5				0.3

Natural mite mortality

Appendix 1

Ordinal number	Colony mark	Treatment product	Date of treatments							Total
			06 Aug	09 Aug	13 Aug	16 Aug	19 Aug	23 Aug	27 Aug	
1	1	BVHC	0	0	0	0	0	0	0	0
2	2	BVHC	0	0	0	0	0	0	0	0
3	3	BVHC	0	0	0	0	0	0	0	0
4	6	BVHC	0	0	0	0	0	0	0	0
5	9	BVHC	0	1	1	0	0	0	0	2
6	10	BVHC	1	2	2	0	2	0	1	8
7	11	Perizin	0	0	0	1	0	0	0	1
8	12	Perizin	2	0	1	0	0	0	0	3
9	13	BVHC	0	1	1	0	1	0	1	4
10	14	Perizin	2	0	1	1	0	1	2	7
11	15	BVHC	2	2	1	3	2	0	1	11
12	16	Perizin	0	0	0	0	1	0	0	1
13	18	BVHC	1	2	2	0	2	1	1	9
14	19	BVHC	1	0	0	2	1	2	0	6
15	20	BVHC	1	0	0	0	0	1	0	2
16	22	BVHC	0	1	1	1	0	2	0	5
17	23	BVHC	0	2	0	1	0	0	1	4
18	24	Perizin	0	0	0	2	1	0	2	5
19	25	Perizin	0	0	0	0	0	0	2	2
20	27	Perizin	0	1	0	0	0	1	0	2
21	28	Perizin	1	2	0	2	1	0	0	6
22	29	Perizin	1	1	0	0	1	1	0	4
23	38	BVHC	2	0	0	2	0	2	0	6
24	41	Perizin	0	0	1	0	0	0	0	1
25	42	BVHC	0	0	0	0	0	0	0	0
26	43	BVHC	2	3	0	2	2	1	2	12
27	44	BVHC	1	1	2	0	0	0	1	5
28	45	BVHC	0	0	0	0	0	0	0	0
29	46	BVHC	4	0	3	1	1	1	1	11
30	47	BVHC	0	0	0	2	0	2	2	6

Examination of mite mortality

Appendix 2

Ord. No.	Colony mark	Treatment product	Control of treatments													
			12 Sept	17 Sept	22 Sept	27 Sept	06 Oct	09 Oct	12 Oct	17 Oct	18 Oct	20 Oct	23 Oct	29 Oct	30 Oct	Total
1	1	BVHC	182	64	74	26	197	82	15	10	98	8	0	0	0	**756**
2	2	BVHC	84	70	99	42	101	12	11	11	80	17	1	1	0	**529**
3	3	BVHC	140	203	126	150	510	228	79	32	22	6	0	0	0	**1496**
4	6	BVHC	45	40	46	31	87	28	15	10	15	0	0	0	0	**317**
5	9	BVHC	20	5	98	22	72	16	21	5	24	4	0	0	0	**287**
6	10	BVHC	370	159	118	76	433	205	82	47	97	23	5	4	1	**1620**
7	11	Perizin	2	1	1	4	150	37	28	15	57	2	0	0	0	**297**
8	12	Perizin	2	4	1	1	172	26	20	8	13	3	0	0	0	**250**
9	13	BVHC	19	24	43	30	210	118	32	16	21	6	0	0	0	**519**
10	14	Perizin	1	0	1	4	350	44	21	11	83	14	1	1	0	**531**
11	15	BVHC	142	71	81	30	331	167	88	40	30	12	3	4	1	**1000**
12	16	Perizin	1	2	4	4	450	91	12	15	19	0	0	0	0	**598**
13	18	BVHC	215	193	88	12	360	148	67	20	35	0	0	0	0	**1138**
14	19	BVHC	84	54	21	88	227	107	41	18	16	3	0	0	0	**659**
15	20	BVHC	147	107	51	59	158	82	50	10	28	25	1	0	0	**718**
16	22	BVHC	309	247	102	98	439	89	45	8	8	3	0	0	0	**1348**
17	23	BVHC	194	115	42	58	327	162	72	53	23	4	0	6	2	**1058**
18	24	Perizin	1	1	2	2	342	57	34	9	22	0	0	0	0	**470**
19	25	Perizin	0	1	1	1	200	21	11	8	14	14	0	0	0	**271**
20	27	Perizin	0	1	1	1	318	33	29	10	20	4	0	0	0	**417**
21	28	Perizin	3	3	2	2	320	24	8	6	21	12	0	0	0	**401**
22	29	Perizin	1	0	2	1	208	27	10	3	62	29	3	0	0	**346**
23	38	BVHC	10	26	31	7	81	32	25	8	30	17	3	3	0	**273**
24	41	Perizin	2	1	1	1	431	67	15	8	10	41	2	0	0	**579**
25	42	BVHC	45	127	76	34	229	103	30	28	28	20	2	1	0	**723**
26	43	BVHC	302	178	73	27	350	221	89	29	20	2	0	0	0	**1291**
27	44	BVHC	188	127	62	40	313	228	58	20	15	26	1	0	0	**1078**
28	45	BVHC	175	143	90	16	256	123	42	15	6	2	0	2	0	**870**
29	46	BVHC	315	104	41	40	320	210	103	30	148	16	2	2	0	**1331**
30	47	BVHC	67	52	48	14	54	50	13	20	6	2	0	0	0	**326**