Effects of EM-1® Application in Honeybee Colonies

*Campo Rural and PROFAM Group Report

Basis Statement:

Lactic acid bacteria are traditionally used to provide texture, scent, taste, quality and nutritional value to food products. There are some bacteria that contribute to improve environment of beehive, therefore are considered and used as probiotics. Probiotics are defined as mono or mixed culture of live microorganisms which applied to animals or humans provide benefits to beehives, improving properties of indigenous microflora. This research based on:

• The proposal was made by beekeepers of Campo Rural and PROFAM who attended a lecture of this product.
• It may replace antibiotics use as oxytetracyclines which can generate dangerous residue (nitrofurans that severely limited the market during 2003-2004 have oxytetracyclines origin).
• Consider the fact that applying antibiotics can remove all kinds of bacteria, exposing beehives to fungal infection and virus.
• Since it is not a specific product for apiculture use and product introduction to the local market is recent, there are still very few precedents.

Objective

• To observe effects of EM-1® on healthy and affected beehive mainly by American foulbrood, Nosemosis or other disease that limit normal evolution of the colony.
• Launch a series of tests using this product and evaluate its results after testing for several seasons and various conditions.

Advantages

• This product could be used permanently while antibiotics should be suspended for approximately two months before honeydew.
• Cost is comparatively lower than other antibiotics used in beekeeping.
• It is a no residue product. An overdose of antibiotics is dangerous since it can pass to honey.
• Not cause drug resistance because they are living organisms.

Materials

Sugar cane (sucrose)
Levudex (Corn syrup high in fructose derived from corn starch, containing about 26-29% of water, 36% of fructose and 33% of glucose)
Water
EM-1®
Testing beehives

Product Activation

Dilute the sugar in one part of water and pour it into the container - we used two different concentrations with two different types of sugar.

	Sugar	Water	EM-1®	Liquid weight
1°	2 kg	18L	1L	20
1´	2 kg	18L	1L	40
2°	4 kg	12L	3L	40
2´	4 kg	12L	4L	65

Sugar used in 1°2° sucrose
Sugar used in 1´2´ Levudex

• Add EM-1® into the container with the mixture mentioned before.
• Add water to fill the container and mix well.
• Keep the solution for a week to ferment in anaerobic conditions.
(For the diluted solution were used 20 liters plastic containers with perforated lids and a safety valve connected to a hose which went to another water container. This system used to keep the anaerobic condition.)
• Check change of color, presence of good smell (bittersweet) and pH below 3.5.

Sample before EM -1® application

Sampling Type	Number	American foulbrood	Nosemosis	
			Results	Level
Bee	1		Positive	1
Bee	2		Positive	3
Bee	3		Positive	1
Bee	4		Positive	4
Bee	5		Positive	
Bee	6		Negative	
Bee	7		Negative	
Bee	8		Positive	
Bee	9		Negative	
Bee	10		Negative	
Beehive	2	Negative		
Beehive	4	Negative		
Beehive	8	Positive		

After three applications of EM -1®

Sampling Type	Number	American foulbrood	Nosemosis	
			Results	Level
Bee	1		Positive	1
Bee	2		Negative	
Bee	3		Negative	
Bee	4		Negative	
Bee	5		Negative	
Bee	6		Negative	
Bee	7		Negative	
Bee	8		Positive	1
Bee	9		Negative	
Bee	10		Negative	
Bee	11		Negative	
Bee	12		Negative	

Bee	13		Negative	
Bee	14		Negative	
Bee	15		Negative	
Beehive	2	Negative		
Beehive	4	Negative		
Beehive	8	Negative		

These data were provided by the Laboratory of Ministry of Agriculture

We can observe that before EM-1® application, the apiary was infected with Nosemosis by 60% in high levels and American foulbrood by 33%. After the second application, infection impact reduced to 3.33% in Nosemosis and 0% in American foulbrood. This demonstrates the product bactericidal action.

Before application of EM-1®			After three application of EM-1®	
Disease	Infected %	not infected %	Infected %	not infected %
Nosemosis	60	40	13.33	86.67
American foulbrood	39	77	0	100

Comparative Graph