



TYPES OF BEE DRINKERS

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Abstract: *A continuous and sufficient supply of top-quality water is imperative for the proper development and survival of bees. Beekeepers often rely on a variety of water containers, each afflicted with numerous shortcomings such as limited capacity, irregular water availability, and subpar sanitation. This analysis aims to investigate the different categories of bee drinkers essential for meeting the water needs of bees. Additionally, we will conduct an in-depth examination of the pros and cons associated with each type of waterer to gain insights into their effectiveness and their impact on bee colonies. Ultimately, we will determine the most suitable waterer for the unique conditions and demands of beekeeping operations.*

Keywords: water, bee drinkers, bees

1. INTRODUCTION

Water is an indispensable element in the lives of all living beings, and this is especially true for bees. Maintaining a continuous supply of water to bees is a key aspect of successful beekeeping and the preservation of bee colonies. Water is essential for bees in multiple aspects of their existence [1,2].

The first and basic function of water in bee society is to cool the hives [1]. Bees actively use water to regulate the temperature inside the hive, especially during hot summer days. Bees collect water and use it to cool the interior of the hive and preserve optimal conditions for the development and survival of the colony.

Another important role of water in the bee world is the dilution of honey [1]. Honey is a key source of energy for bees, but sometimes it can become too thick. The bees then use the water to separate the honey so they can consume or store it. This is essential for their nutrition and survival.

Furthermore, water plays a key role in the development of young bees. The bees use the water to prepare the beebread to feed the larvae. This is a vital step in the process of reproduction and renewal of the bee colony.

For bees to perform these vital functions, it is necessary to ensure the availability of clean water in their environment. Lack of water can have serious consequences for the health and productivity of the bee colony. Dehydration of bees can lead to a decrease in honey production, poor brood quality, and a decrease in the number of bees in the hive. The amount of water required by the colony depends most on the amount of bee brood and the external temperature. Water fluxes of honeybees can be very high at the colony level. For example, average annual requirements of 120 kg of nectar,

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20 kg of pollen, and 25 litres of water for a single wild colony are estimated [3]. This applies to honeybees in cold temperate conditions [4].

The way bees access and use water can vary depending on the environment and weather conditions. Bees will usually look for water sources near their hives, such as streams, lakes, fountains, or even dew drops on plants [5]. However, it is important to pay attention to the quality of water consumed by bees. Unfortunately, in some cases, the water that bees find may contain harmful substances.

This problem often appears in areas of intensive agricultural activity. The use of various chemicals for crop protection and weed control can lead to pollution of surrounding waters. When collecting water, bees can unknowingly introduce these harmful substances into the hive, which can have serious consequences for their health [6].

In addition, during longer periods of drought, water sources often dry up, making it even more difficult to supply water to bees [5]. Bee diseases (for example: American foulbrood - *Paenibacillus larvae*) can be spread by endospores, the form that allows survival in extreme conditions (in water and soil) and to have active form as soon as it reaches the brood [7]. While cleaning the beehive bees take out waste from possibly infected brood and their parts are scattered around the beehive, as well as the excrement, that can end up in a water bowl.

Therefore, for the preservation of bees and bee colonies, it is important to carefully monitor and ensure access to clean water to ensure their successful operation in the ecosystem.

In this analysis, it is shown the different types of drinkers that are essential for the proper supply of water to bees. In addition, were discussed in detail at the pros and cons of each of these waterers, in order to better understand their effectiveness and impact on bee colonies. Finally, it presents which type of drinker fits best in the different conditions and needs of beekeeping operations.

2. TYPES OF DRINKING BOWLS FOR BEES

The paper presents the design and implementation of drinking bowls for bees, emphasizing simplicity and accessibility. These bowls can be easily installed in gardens, parks, and urban areas, providing bees with a reliable source of clean water. A bee drinker is one of the important elements in beekeeping equipment that allows bees access to water, which is crucial for their nutrition. Drinking bowls for bees can be of different types and sizes, depending on the needs of the bee colony and the environment in which it is located [5]. A key aspect of the drinkers is to ensure that the bees can get to the water easily, but at the same time prevent the water from becoming contaminated or evaporating too quickly. Waterers are placed near the hive so the bees can get to water quickly without wasting too much energy.

There are different types of hygienic bee drinkers, each with its own characteristics and advantages. Some of them are presented in the paper [5]. In practice, various devices are often used to feed bees. Figure 1. is just a part of the various drinker cans that can provide water for their bees. Caring for bees and their needs, including providing water, is crucial for any responsible beekeeper. With this type of watering can, there is a big problem with hygiene, because the containers are constantly open, and contamination of the water can occur.

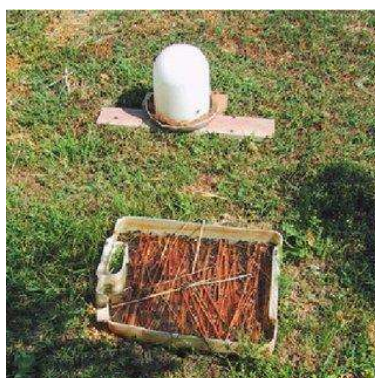


Figure 1. Bee drinkers as an open container [5].

Another example of a drinker can for bees described in the paper [5] is a traditional drinker can for bees. This drinker can is in the form of a wooden board on which water drips from a barrel placed on top (see Fig. 2). Slanted slats are placed on the board, which allow the water to stay on it as long as possible. The advantage of this drinker is that a large number of bees can take water, and a constant flow of water is present in these drinkers. Since this drinker hole is also open like the previous one, the tendency to create parasitic diseases is much higher, and therefore this watering hole is not suitable for use.



Figure 2. Wooden drinker for bees [8].

In recent times, inverted glass containers closed with a perforated cover or a piece of cloth are being used more and more often as hygienic drinkers for bees [5]. These containers meet hygienic requirements, and their price is low. The advantage of these watering cans is that the bees do not drown in the water, so there is no danger of droppings coming into contact with the water due to the position of the bees when drinking water. The lack of these drinkers necessitates the constant presence of a beekeeper who must regularly refill the containers because these watering cans are suitable for feeding bees up to 10 hives. Another disadvantage of these drinkers is that the wet cloths used to close the waterers are prone to bacterial growth. Also, these drinkers are ineffective due to the lack of water under the direct influence of the sun, which leads to an increase in the temperature of the water.

The automatic drinker is another option for bees seeking refreshment (see Fig. 3). In these drinker cans, the water level is regulated by a float, like in a water tank. The advantage of this watering can is the large amount of water that can be used to water a large number of bees at the same time. Regrettably, the drawback of this method lies in the barrel's potential lack of cleanliness due to the large landing surface from which bees take water and which is easily contaminated.



Figure 3. Automatic drinker for bees [9].

One of the patents that was made concerns a honeybee breeding apparatus, which is strategically placed within beehives to dispense feeding liquid for bee breeding [10]. More specifically, it focuses on an automated honeybee breeding apparatus, which ensures precise feeding liquid delivery, minimizing the chances of supply paths becoming obstructed by bees' secretions. The primary aim is to streamline the feeding process and maintenance, particularly cleaning [10].

Another one of the patents is the smart hygienic bee water drinker, a closed system that completely and simply solves the problem of watering [1]. This drinker can provide a sufficient amount of hygienically correct water and safe drinker of the bees. The device enables the application of high standards in accordance with the food safety policy, which was not possible until now. The bee trough is a central gathering place for water-carrying bees from all hives in the apiary, allowing water from one container to be available to all [1].

3. CONCLUSION

This paper provides an overview of existing bee-drinking fountains with all their advantages and disadvantages. While they can play a vital role in supporting bee health, it is essential to weigh the benefits against the potential drawbacks of these drinkers. Careful management and environmental considerations are crucial when deciding to introduce drinking bowls for bees, ensuring that they are a net positive for these vital pollinators.

In some further research, it is possible to choose the most optimal materials for making drinkers, as well as various methods of producing them. Some of the possible solutions are 3D printed drinkers with carefully selected materials and printing processes.

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