COMPARATIVE STUDY OF TWO METHODS OF HONEY HARVEST (SINGLE AND PARTIAL)IN THE ALGERIAN CENTER.

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Abstract:
This work aims to highlight the one hand, the effect of harvesting method on honey yields and, secondly, the effect of the model on the evolution of the hive and brood production honey. The comparative study was conducted on bee colonies Apis mellifera intermissa Tellian""conducted in two modelsnamely the Langstroth hives and in Mitidja Dadant (central Algeria). Twoharvesting methods were tested: the single harvest of crops and the partial(two samples).
The results show the advantage of the method of partial harvests that can produce far more honey than the single harvest, the effect is significant. This finding was verified in two models of hives. This advantage seems to be attributable to the release of the space inside the hives for crop lines partielles. This factor appears to stimulate the queen to step up its activities and laying workers to collect more nectar.
As for the model hive, the results are in favor of the Langstroth hive. The latter by its undeniable advantages allows a better development of the brood from the Dadant, the differences are quite significant. For its part, the Langstroth hive can provide greater production
of honey that Dadant. In thelatter, larger, settlements are increasingly faced with climatic hazards
anddevelop late relative to those housed in Langstroth and are therefore lessactive during the honey (raw honey mostly).
Keywords: Method of harvesting honey, Style Hive, hive Langstroth, Dadanthive, brood, hon ey production.

1.Introduction

In Algeria, the meeting of the factors necessary for the implementation of beekeeping has allowed this activity to acquire an important place in agricultural development programs since the agricultural revolution until today.
However, beekeeping Algeria remains a sector in its entirety if not traditional in the best cases a chain of modern practiced extensively. Since independence, Algeria has opted for the first time for a single model called the Langstroth hive, without any prior scientific study. Thus, the potentials remain underutilized honey (12.5% of honey production in 2008). This is due to the lack of professionalism (2.5%), the majority of beekeepers are still using archaic methods (MATRESE, 2007 and ANONYMOUS, 2009) and have no interest to follow the evolution of bee flora (the floral calendar) and make only one crop of honey per year, and in the best cases, two crops per year, where few are the professionals who make more than two harvests a year.

The main objective of this study is to compare the production of honey from two harvesting methods: one single and the other two samples (partial harvest), and that in two models of hives and Langstroth hive Dadant hive ten frames.

2.Materials and Methods

This study was conducted in an experimental apiary in the plain of Mitidja (Algiers) on 40 colonies of the local breed "Apis mellifera intermissa" housed in two models of Langstroth and Dadant. These colonies were divided into two experimental groups (A) and (B) (carte.1).

The colonies of the two experimental plots were selected (by sampling found) at the end of

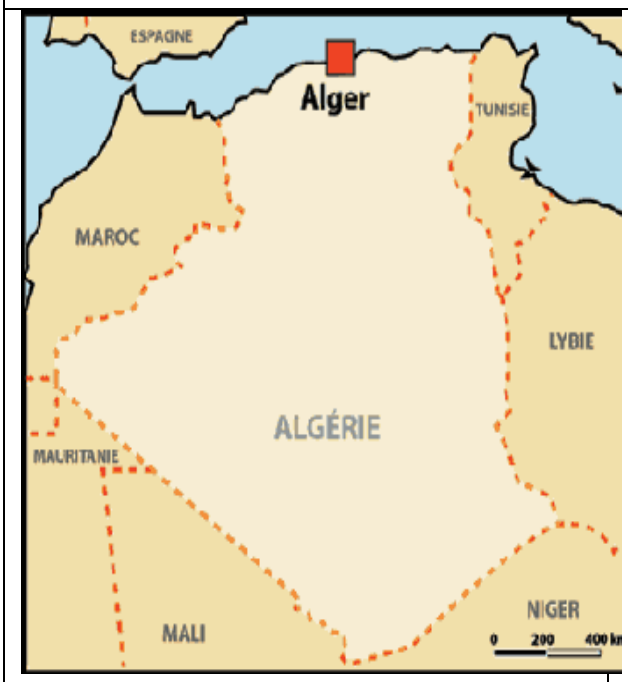

Chart 1. Localization of the experimental apiary (Google map, 2010)

August 2008 and were equivalent force (5 frames of brood and bees with 5 frames of provisions) and had fewer queens two years of age. Colonies were randomly distributed between the two lots and placed in the apiary, in equal numbers (20 colonies from each experimental group, 10 of Langstroth and 10 of that of the Dadant). Lot (A) was conducted

for partial harvests while the batch (B) was conducted for the single harvest.
Colonies of two lots received the same treatment of late-season (anti-varroa treatment and feeding) and at the same time. The treatment was performed with a synthetic accaricide (Apistan ®) as of november. Both lots have also received treatment of oxalic acid on Nov. 9. These treatments are done in conjunction with the feeding of extra syrup sucrose (2: 1). Also note that the settlements selected in the sample were completely free of disease. The settlements came during the winter season in mid November until mid February. From that date the queens started to intensify their spawning activity.
Every two days during the spring, he was taken to a feeding stimulant to stimulate foraging for harvesting raw honey and queens to spawn, and that at 200 ml sugar syrup to the following proportions: 1 liter of water to 250g of sugar (1 / 4).
Both parameters studied for each lot are the brood area of colonies and honey production. To measure brood area was used the method described by LAVIE (1968) based on the calculation of the surface of the ellipse of brood. And finally, the honey yield was assessed by weighing solid frames before and after extraction.
Harvesting of honey is made by two methods

Partial harvest

For this method two harvests were made. While honey is still abundant, the first increases in Dadant hives full of honey filled are removed and replaced by another filled with wax foundations for subsequent harvests. For Langstroth hives, only the second body frames that are filled are removed, because there is also the presence of brood in this period mid spring. Bundles of harvested honey are emptied of their honey and immediately returned to their seats. The harvest dates are noted in Table 1.

Single harvest

For this method, the harvest is done once all the honey are completed and the main contributions of honey become careless. In this case, we remove all the ups and secondary bodies of the two types of hives to extract, at once, all the existing honey

Table 1. Date of harvests of honey

	EXPERIMENTAL STATION	
	Partial harvests(RP)	Single harvest(RU)
Date	05/06/2009 21/07/2009	27/07/2009

The results were analyzed by using software SPSS (Statistical Package for Social Sciences). The comparison between the experimental batches was carried out and tests LSD (Least Significant Difference1)

3 . Results

3.1.Effect Model hive on the evolution of brood

Brood development in the four experimental groups was used to follow the evolution of egg laying queen in each hive models.

3.1.1. Case of partial harvests

Colonies of both types of hives had an average initial brood dissimilar (2950cm2 and 2100cm2 respectively those of the hive Dadant and those of the Langstroth) (Figure 1 and Table 2).
As soon as February, the spawning activity intensifies and brood size has grown steadily until it reaches the climax at the end of April for the Langstroth hive and a week later for the Dadant hive. Surfaces planimetries maxima in the two types of hives and matched 23000cm2

21450cm2 respectively for Langstroth and Dadant.
It should be noted that the brood area was greater in the Dadant hive in the hive Langstroth. However, from mid-March (early spring) it has become more important in the Langstroth hive. This difference increased gradually with temperature despite a trend common to both groups of settlements to increase the extent of spawning.
From the end of the first week of May, which corresponded to the introduction of grids queens, brood suffered a sharp decline in the two models of hives following the decrease in spawning activity of Queen due to lack of space. However, the decrease was more remarkable for the Langstroth hive. A recovery was recorded after the first harvest (late May), which was more pronounced in the Langstroth hive compared with those of the other type. Subsequently the extended brood continues to decrease due to the restriction of spawning, and the minimum was observed in November.
In general, the evolution of brood was greater in the Langstroth hive in the hive Dadant.

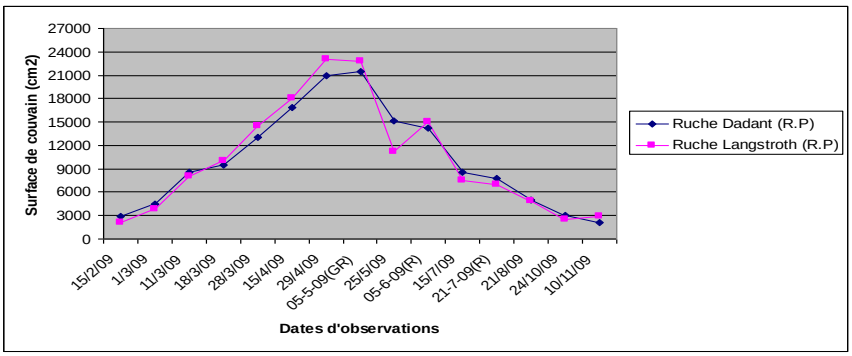

Figure 1: Evolution of the Surface Of The brood in cm ² in The Two types ofhives (partial Harvest).

3.1.2. Cases of single harvest

In Figure 2 and Table 2, the
evolution of brood was performed differently forthe two models hives; evolution has been mo re regular for the Langstrothhive in which the maximum brood 32020cm2 reached, while for Dadant hive, there was a slowdown during the month of March. The maximum value was recorded a month later or at the end of May. However, the surface of
maximum brood was significantly higher than that
recorded in colonieshoused in Langstroth (25000cm2 is 2000cm2 difference).
After laying queen excluders in early May, a sharp drop in the surface of the brood in the hive Langstroth manifested, while that of Dadant has continued to grow until it reaches its maximum at the end May, then declinedgradually to reach a minimum in mid-October.

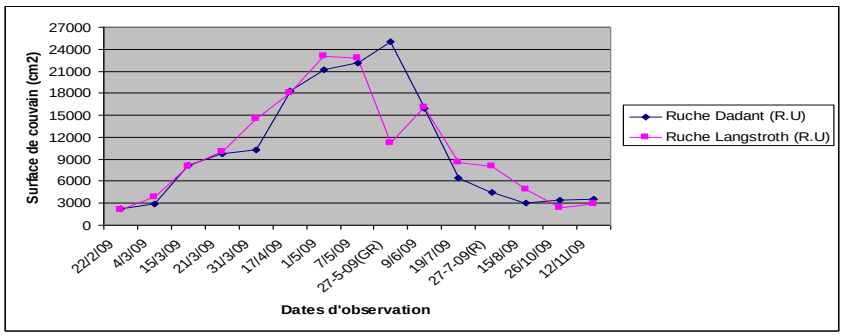

Figure 2: Evolution of the brood area in cm ² in the two types of hives in cm ²(single crop).

The ANOVA results of the evolution
of brood in both hives models shows asignificantdifference between the two
models of hives to a probability of 5%. The hive model has an apparent
effect on the evolution of brood, the best results being obtained in the Langstroth hive.

Table 2: Effect of type of hive on the evolution of brood (comparison ofmeans)

Partial harvests			Single harvest		
Dates of observation	**Dadant hive**	**Langstroth hive**	Date of observation	**Dadant hive**	**Langstroth hive**
15/02/09	2950 ±370*	2100 ±151*	22/02/09	2215 ±473	2100 ±105
01 /3/09	4500 ±231*	3860 ±296*	04 /3/09	2865 ±866*	3820 ±92*
28/03/09	13000 ±714*	14500 ±1780*	31/03/09	10250 ±1671*	14520 ±132*
15/04/09	16900 ±1017	18000 ±1780	17/04/09	18250 ±1671	18020 ±132
29/04/09	21000 ±1944*	23000 ±1780*	01/05/09	21250 ±1671*	23020 ±132d*
05/5/09(GR)	21450 ±2127	22800 ±1680	07/5/09	22150 ±1997	22720 ±132
25/05/09	15100 ±1868*	11200 ±1780*	27/05/09 (GR)	25000 ±1832*	11220 ±132*
05/6/09(R_1)	14200 ±1874	15000 ±1780	09/6/09	16000 ±3859	16020 ±181
15/07/09	8550 ±725*	7500 ±890*	19/07/09	6400 ±1082*	8520 ±132*
21/7/09(R_2)	7810 ±584*	7000 ±890*	27/7/09(R)	4450 ±550*	8020 ±132*
21/08/09	5000 ±782	4900 ±899	15/08/09	3000 ±359*	4920 ±132*
24/10/09	3000 ±283*	2300 ±899*	26/10/09	3450 ±550*	2320 ±79*
10/11/09	2100 ±151*	2900 ±899*	12/11/09	3530 ±910*	2920 ±132*

* The mean difference is significant at the .05 level.
R1: First harvest
R2: Second Harvest
GR: Last inplace of the queen excluder

3.1.3.Cases of partial harvests

The average honey crop (mostly citrus) obtained during the first
extraction(05/06/09) were different, the best yields were obtained in the Langstroth hive,
an average of 6.35 kg / hive against 4.3 kg/ hive for Dadant (Figure 3).
The same observation was made during the second harvest, which recorded average of
5.65 kg/ hive to hive Langstroth and 4.2 kg / hive for Dadant (Figure 3).
The total quantities of honey harvested in the two crops totaled 12 kg / hive
to those of Langstroth and 8.5 kg/ hive to those of the other model, a difference of 3.5 kg
per hive.

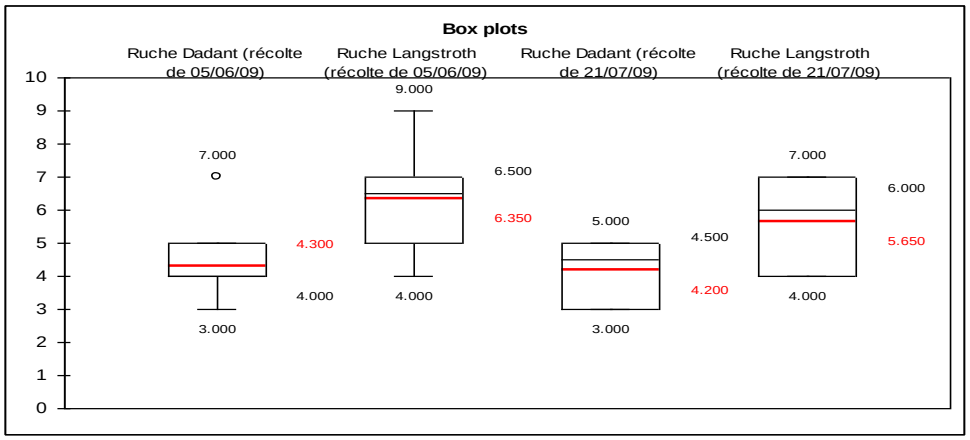

Figure 3: Production of honey depending on the model of hives in kg.

3.1.4. Cases of single harvest

Langstroth hive has provided more honey than the Dadant (an average of 7.8 kg / hive against 5.25 kg / hive) (Figure 4).

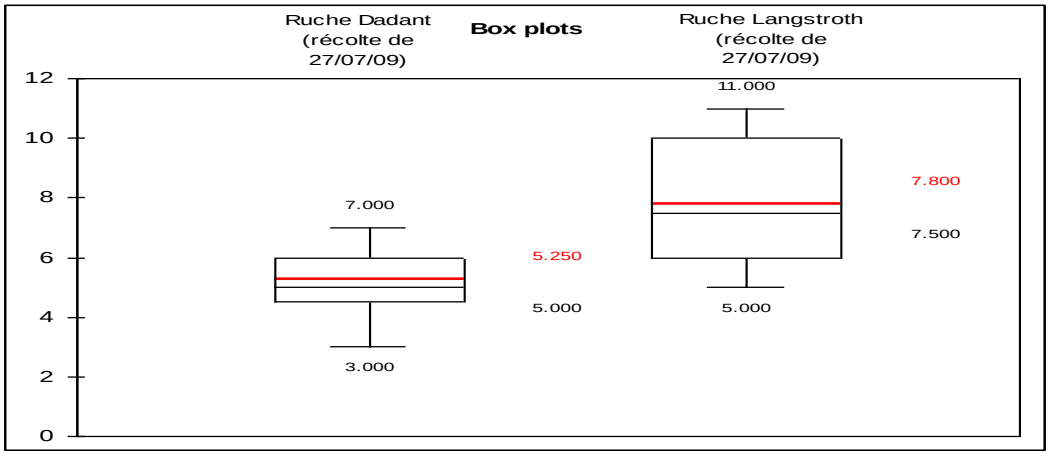

Figure 4: Production of honey depending on the model of hives in kg.

The ANOVA results of honey production reveals that
the difference betweenthe two models is statistically significant hives during partial harvesting (FC1= 10.33, Fth1 = 0.005; Fc2 = 8.36, Fth2 = 0, 01, p = 0.05) (Table 3).
a highly significant difference was also observed for the single harvest, (Fc =10.41, Fth = 0.005, p = 0.05).
These results indicate that the influence of model beehive honey production is apparent in the two methods of partial and single harvest. The Langstroth hive can provide a higher output compared to the hive Dadant.

Table 3: Effect of type of beehive honey production (comparison of means)

ANOVA		Somme of the squares	ddl	Average of the squares	F	Signification
récolte de 5/06/09	**Inter-groups**	21.01	1	21.01	10.33	0.005
	Intra-groups	36.63	18	2.03		
	Total	57.64	19			
récolte de 21/07/09	**Inter-groups**	10.51	1	10.51	8.36	0.010
	Intra-groups	22.63	18	1.26		
	Total	33.14	19			
récolte de 27/07/09	**Inter-groups**	32.51	1	32.51	10.41	0.005
	Intra-groups	56.23	18	3.12		
	Total	88.74	19			

3.2.Effect of harvesting method on honey production

Production allowed by the partial harvests were larger than those permitted by the single harvest, and that for both types of hives (Figure 5). For the Dadant hive, there was a production of 8.5 kg / hive when partial harvests against 5.25 kg / hive at the single harvest, while for the Langstroth type there was a production 12kg/ruche cons 7, 8kg/ruche.

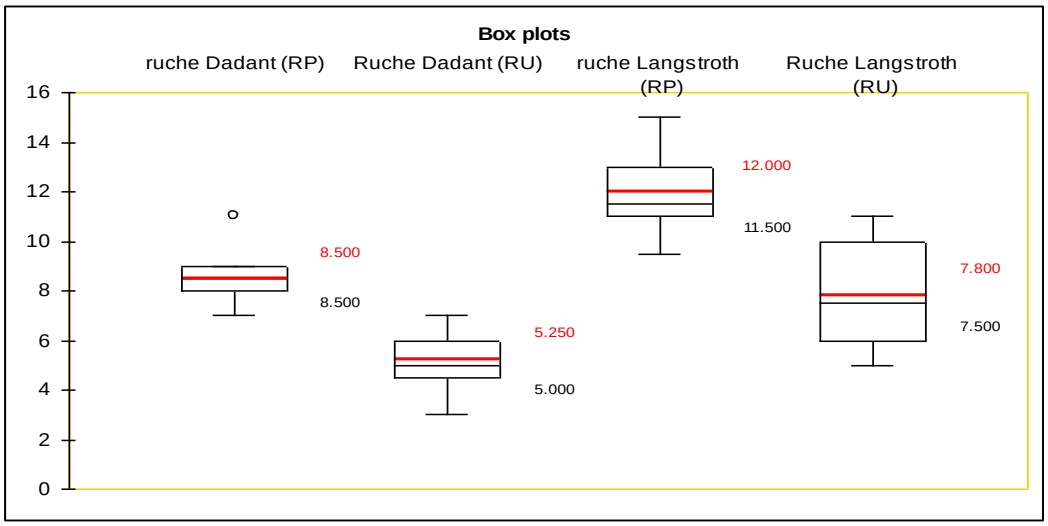

Figure 5: Production of honey according to the method of harvest in kg.

The ANOVA results of honey production achieved by the two methods of harvesting showed statistically significant
differences at 5% probability forboth models Langstroth and Dadant (Table 4).
These results indicate a clear influence of harvesting method on honey production.

Table 4: Effect of harvesting method on honey production (comparison of means)

ANOVA		Somme of the squares	ddl	Average of the squares	F	Signification
production of honey .	Inter-groups	52.81	1	52.81	35.05	0.0000
Dadant hive	Intra-groups	27.13	18	1.51		
	Total	79.94	19			
production of honey	Inter-groups	88.20	1	88.20	23.31	0.0001
Langstroth hive	Intra-groups	68.10	18	3.78		
	Total	156.30	19			

4 . Discussion

The evolution of brood held regularly for both models of hives.
The decrease in brood along the wintering period illustrates the cyclical behavior of bees following the seasons, the colony goes through phases of working life with alternating periods of quiescent (Prost, 1987). During the winter, low temperatures and lack of nectar resources

block or impede the laying of the queen and brood rearing. In our apiary, the laying of the queen has not been completely blocked because the outside temperatures do not drooped below 10 ° C along the winter of 2008.
In mid February, the Queen resumed her eggs at first then slowed even more actively in the flow of nectar become more abundant, the surface of growing brood.
The regression of the brood during the summer period is probably due to:
-Storage of honey in the honeycombs at the expense of brood (BERKANI, 2007);
To higher temperatures; SHUEL (1964) shows that during the summer, the colony's development is hampered by the restriction of the area of brood, caused by the inability of bees to keep the brood the required temperature;
To the shortage of resources bees. Thus, MONTAGNER (1962) notes that the end of the honey flow is marked by a decline in egg production.
The evolution of brood is more regular in the Langstroth hive in the hive Dadant. Makes it more bulky live in colonies more susceptible to unfavorable weather conditions (BERKANI et al., 2007), a cause which led to the sudden decline of the surface when a brood of climate disruption occurs because the queen will focus her eggs only the center rays.
The brood has evolved more in the Langstroth hive in the hive Dadant. This could be explained by way of design of the hive, as the Langstroth hive queen is able to move freely between the body and increase allowing it to expand his brood as possible, while in the Dadant the evolution of the colony was strictly limited in the body, the design of this type prevents the hive queen to get on and lay in the rise.

The method of partial harvesting allows a higher production of honey, the effect is significant. This result is probably related to the space available inside the hives, colonies led to partial harvests find enough space after the first harvest, a factor that has led to collect more nectar and work with more ardor, especially in the presence of strong honey early summer. By cons, those conducted for the single harvest, were confronted by the brood that has occupied the space inside the hives. It is important to note that the bees have made large reserves feel less attracted to the honeydew (LOOK, 1981et 1988).

Factors influencing the harvest of nectar are not yet well known, however the smell of the queen, the presence of worker larvae and empty shelves were one of the reasons pushing the bees to collect nectar (JAYCOX, 1974and RINDENUR, 1981, quoted by WINSTON, 1993).
The establishment of the queen excluder, the latter caused the reduction in the area of brood. She was put in place 20 days ahead in the colonies led to partial harvests, which led to the restriction of the early brood area. Thus, a high percentage of nurse bees have been turned into foragers. In contrast, in the colonies led to the single harvest, the bees were occupied by the brood-rearing. The latter requires a higher thermoregulatory activity and higher consumption of honey (LAERE, 1965). And even if there were an equal number of foragers, many of them collect pollen to feed the brood still open (CALE, 1968, quoted by WINSTON, 1993).
Prost (1987) finds that the more open brood is abundant in the honey, the more the colony needs of nurses and it has less of foragers. If laying of the queen is blocked or at least greatly reduced ten days before the start of a great honey, many nurses become foragers.
SZABO et al (1993) reported that the frequency of honey removal significantly influenced the production of hives and honey quality. Colonies that have undergone 2 abductions of honey have performed better with an average production of 142.1 kg, or 34% more than a single kidnapping.
As for the model beehive, the Langstroth can provide a larger output than the Dadant. The results are significantly different because the influence of the model appears hive is obvious. This result is probably related to the importance of brood during the spring season is with the number of foragers at honey is very important. LIEBIG (1993) (quoted by Kuhn et

al., 1996), indicates that conditions of good honey flow, colonies are more severe over the quantities of honey collected is important. For its part, the COUNT (quoted by PROST, 1987) reports that the percentage of foragers is even higher than the total population of a colony is greater.

5.Conclusion

The comparative study of two methods of harvesting honey in colonies of Apis mellifera intermissa conducted in two models namely the Langstroth hives and Dadant by observing the curves of the evolution of brood showed that the method of partial harvesting can provide a greater production of honey from the unique method of harvesting. This finding was verified in both types of hives.

By several crops, the space available inside the hives will be more important factor that encourages the bees to collect nectar and more work with greater zeal, especially in the presence of strong honey early summer, a situation Conversely in the case of a single harvest when the bees are confronted with the lack of space inside the hives will be less attracted to honey.

As for the model hive, the study showed the best adaptation of the Langstroth hive development of colonies of bees, their biological activity and thus the production of honey. The arguments above can already promote Langstroth hive in at least the Algerian coast where breeding conditions are better beekeeping. It produces more honey than the Dadant hive, and lighter and more maneuverable than the Dadant hive, because of the interchangeability of its components. It also allows a steady development and more rapid colony of bees dice that contiones become favorable climate (especially in mild Mediterranean climate), a colony Langstroth can easily spend the winter without artificial feeding with a single body full of honey in the autumn. It is a type particularly suited to the transhumance Mediterranean climate where winters are short and somewhat difficult.

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