

## FERMENTATION OF HONEY

*In one of his articles (L'Abeille de France, October 1974), Alin CAILLAS wrote :*

Fermentation of honey is favoured by several conditions : (1) storage at high temperatures, exceeding  $+14^{\circ}\text{C}$ , (2) its being extracted too early, and (3) a too high moisture content.

These three major causes could be easily eliminated, but there is a fourth, very important one, which I wish to draw your attention to — the existence of yeasts.

Which is their effect ? They act on every kind of sugar decomposing them into alcohol and carbon anhydride which evaporates into the air.

Sugar in excess, or better say the too high sugar content together with the excessive concentration of alcohol act, at a given moment, as a break of yeasts and the process of fermentation stops. The carbon anhydride causes the formation of bubbles in the sweet liquid. This phenomenon occurs when starting preparation of honey mead.

There is not only one kind of yeast. By cultures obtained from fermented honey, the experts found out that two kinds of yeast exist, with diametrically opposed properties. To be more simply for you, I shall call them sugar-tolerant and sugar-resistant yeasts. The former act on sugars and consequently cause fermentation. The latter are completely inoffensive as they resist and exist even in a medium which is too sweet to allow their development, and fermentation does not take place.

Which is the origin of these inopportune yeasts, and how is it possible to find them in honey sometimes in great numbers ranging from 6,000 to 1,000,000 cells/g of honey ? It is a real infection of honey which has no noxious effect on the consumer but makes honey improper for sale and consumption.

Many investigations were made of yeast cultures on adequate media which led to the conclusion that the main cause lies in nectar.

Important for beekeepers is to prevent honey from being invaded by these yeasts. First, measures of precaution should be taken, so that no favourable conditions exist for development of yeasts :

(1) to store honey at low temperatures, (2) to pasteurize honey — although by this process it is deprived of its biological qualities but, as people say, of two evils one should choose the less, and (3) also recommended is to periodically disinfect the combs in the apiaries where fermentation of honey occurs frequently.

*And in American Bee Journal, No. 2/1974, Richard TAYLOR :*

"Honey is caused to ferment or "go sour" by the presence of yeasts, but these can develop only in honey that has a high moisture content, that is, honey that is "thin". Even heavy, well-ripened honey can absorb moisture from humid surroundings, however, and become vulnerable to fermentation. Honey kept in a refrigerator or otherwise kept cold does not ferment, though it is still subject to fermentation as soon as it is restored to normal temperature. Honey that has been heated to  $160^{\circ}\text{F}$ . is not likely to ferment, as this destroys the yeasts. Granulation does not prevent fermentation. Honey combs offer little protection, even when well capped, and these should accordingly never be stored where it is damp while awaiting extraction. Honey extracted from supers that have been stored even for a day or two in the presence of dampness is almost certain to suffer some fermentation. Honey left in an open container in a damp basement, or in a honey house during damp weather, usually ferments. Often fermentation is so slight that an inexperienced beekeeper does not realize that it has occurred, but even slight fermentation leaves honey tasting flat at best.

"Fermenting honey forms bubbles on the surface, and usually foaminess to some degree. Sealed containers, such as pails or five-gallon cans, may show swelling. The honey itself may have a slightly yeasty odor.

"Honey that is thick is not very liable to fermentation, provided it is sealed and stored in a dry place. There is, however, no practical way of driving excess moisture from thin honey and restoring its thickness.

"When there is fear of fermentation the only preventive measure is to heat the honey in a water bath as rapidly as possible to 160°, then cool it as quickly as possible and seal it tightly. This also greatly retards granulation, by dissolving residual crystals which would otherwise precipitate granulation. Honey thus heated is not seriously damaged, and is usually indistinguishable from unheated honey, provided it is cooled promptly. The container must never come in contact with the source of heat. It must instead be submerged part way in hot water.

"Honey that has actually begun to ferment need not be discarded, provided fermentation has not gone too far, as it usually has not when discovered, since honey ferments slowly.

"Such honey will usually be in five-gallon cans. The sign of fermentation is a foaminess at the opening. The beekeeper should not be dismayed at this discovery, for it is likely that fermentation has occurred only at and near the surface, where the honey has been able to absorb moisture from the air.

"The treatment is to heat the honey to 160°F. in a water bath, pack it in new containers, and seal tightly.

"Such honey will not have all the flavor it originally had and will, in fact, have a certain flatness of taste, but at least every other sign of fermentation will have been eliminated, and the honey will be perfectly usable."