Number four in a series of ten articles on the different honeys of America.

Analytical data are transferred to IBM cards by Judy Lorenson, prior to computation.—Photo by M. C. Audsley, USDA.

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# A Survey of American Honeys

## 4. Effect of Crop Year on Composition

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IN THE COLLECTION of honey samples from over the United States for this project, honey was collected from the two crop years, 1956 and 1957. This was done because insufficient samples had been obtained from one year to fill our requirements, and

1/ This is one in a series of articles describing a large-scale study of the composition of honeys from over the United States. Complete data interpretation and conclusions will appear in a forthcoming Department of Agriculture publication.

also because we hoped that information might be obtained that would throw some light on the amount of variation in honey attributable to the effect of the crop year. We realize that collection for only two years is quite insufficient to provide definitive information about this factor, but we were limited as to the number of samples we could handle, so were obliged to consider only the two years.

**Average Composition for the Two Years**

In the first article in this series the average analysis was given for all honey samples analyzed. Here we present the average analyses of all 1956 honey samples and of all 1957 honey samples. Table 1 shows the values. It can be seen that the average 1957 honey was somewhat lighter in color, slightly lower in granulation tendency, slightly higher in levulose, lower in undetermined material, and otherwise quite similar to the 1956 honey. These two averages are not made up of corresponding samples, however, and their

**Table 1. Average Composition of Honey Samples for Two Crop Years**

| | 1956 | 1957 |
|---|---|---|
| No. of samples | 182 | 297 |
| Color | Light part of Extra Light Amber | Dark part of White |
| Granulation Tendency | 1/2" layer of crystals | 1/8-1/4" layer of crystals |
| Moisture (%) | 17.0 | 17.3 |
| Levulose (%) | 37.92 | 38.36 |
| Dextrose (%) | 31.15 | 31.37 |
| Sucrose (%) | 1.32 | 1.31 |
| Maltose (%) | 7.44 | 7.22 |
| Higher Sugars (%) | 1.69 | 1.38 |
| Undetermined (%) | 3.4 | 2.9 |
| pH | 3.96 | 3.88 |
| Free Acidity (meq./kg.) | 22.16 | 21.95 |
| Lactone (meq./kg.) | 7.05 | 7.15 |
| Total Acid (meq./kg.) | 29.21 | 29.10 |
| Lactone/Free Acid | 0.336 | 0.334 |
| Ash (%) | 0.173 | 0.166 |
| Nitrogen (%) | 0.041 | 0.041 |

values depend on the sample response from producers for the two years.

### Comparison of Legume Honey Averages

There are two other ways that our data can be studied to produce information on the general question of effect of crop year on composition of honey. One is by comparison of average values for the same floral types for the two years. The other is by comparison of samples from the same producer and from the same type and area for the two years.

There were seven important floral types and blends (110 samples) for which we had enough samples to allow averaging of values for each crop year. When this was done, it was seen that in practically all cases where there was a difference in the averages for the two years, it was no greater than the variation normally encountered between samples of that type of honey for one year. Statistical tests were applied and only in the case of granulation tendency were any significant differences found between the two years. Here the 1957 honey granulated less.

### Comparison of Matching Individual Samples

For the final type of comparison of one year's honey with another, we had 22 samples, one from each year, from the same producer and location for 11 floral types. This kind of comparison should reflect actual differences in the "same" honey over the two years, since the samples are matching. This was not the case in the first two types of comparison.

The comparison of these samples is given in Table 2. Here a plus sign means that the 1957 sample was appreciably higher than the 1956 sample in that characteristic, a minus means the opposite, and no mark means that there was no difference. The last line of the table, "Total" gives the number of samples in which differences were found between 1956 and 1957 samples for that attribute. Here the size of the differences is about that amount that could be reliably detected using our

Table 2. Comparison of 1957 Samples with 1956 Samples, each from Same Producer, Location and Floral Type

| | Color | Granulation | Moisture | Age | Levulose | Dextrose | Sucrose | Maltose | Higher Sugars | Undetermined | pH | Free Acid | Lactone | Total Acid | Lactone/Free Acid | Ash | Nitrogen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alfalfa-sweet clover | - | | + | + | | - | - | + | + | | - | | - | | - | | - |
| Aster | | | + | - | | - | | | | | - | +- | + | + | + | | + |
| Blend | - | | - | - | + | + | - | | + | | - | | | | + | + | |
| Chinquapin | | + | + | | + | + | | | - | - | - | + | + | + | + | | + |
| Clover, white | - | - | + | | - | - | | + | | | - | | | | | - | |
| Coralvine | | | + | | | - | | | | | | | | | | | + |
| Cotton | | | | | - | | - | | | | | | | | | + | + |
| Gallberry | + | | + | - | - | + | | - | - | - | - | + | + | + | + | + | |
| Privet | - | | | | | + | + | + | | - | - | - | - | - | | - | |
| Raspberry | | | | - | - | - | - | - | + | + | + | + | - | + | - | + | + |
| Vetch | | - | - | | - | - | + | + | + | | | | | | | + | |
| TOTAL | 5 | 3 | 8 | 5 | 7 | 10 | 6 | 6 | 6 | 4 | 7 | 5 | 6 | 5 | 6 | 7 | 6 |

analytical methods. Many of them have little actual effect on properties and uses of the honey. Thus, dextrose content is the most variable property in these samples, with 10 of 11 samples showing differences from year to year. These differences were generally small however, since only three samples had appreciable differences in granulating tendency. As might be expected, moisture content showed a high degree of variation. The 1957 samples were generally higher in moisture than those from 1956. The variability of other factors may be seen in the table.

In presenting and discussing these results, we do not mean to suggest that there is at this late date any practical interest in honey from the 1956 and 1957 crops as such. Rather these data and discussions are meant to give a general idea of how much variation can be expected from this source.

The complete individual analytical values and a more complete discussion of all the factors here described is planned to be published as a U.S. Department of Agriculture Technical Bulletin.

Next month: - Effect of area of production on composition.

The cards bearing the analytical results are machine sorted by Dr. White during the analysis of the data.—Photo by M. C. Audsley, USDA.